Date: 15 February 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 200 Area Source Characterization - 200-CW-1 Operable Unit
Subject: PCBs - Data Package No. H0590-RLN (SDG No. H0590)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0590-RLN prepared by Recra LabNet (RLN). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B0WMD1	10/21/99	Soil	C	PCBs by EPA 8082
B0WMD2	10/21/99	Soil	C	PCBs by EPA 8082
B0WMD3	10/21/99	Soil	C	PCBs by EPA 8082
B0WMD4	10/21/99	Soil	C	PCBs by EPA 8082
B0WMD5	10/21/99	Soil	C	PCBs by EPA 8082
B0WMD6	10/21/99	Soil	C	PCBs by EPA 8082
B0WMD7	10/21/99	Soil	C	PCBs by EPA 8082
B0WMD8	10/21/99	Soil	C	PCBs by EPA 8082

Data validation was conducted in accordance with the BHI validation statement of work and the *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*, DOE/RL-99-07, Draft B. Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

  If holding times are exceeded by less than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detected sample results are qualified as estimates and flagged "J" and all nondetects are rejected and flagged "UR".

  All holding times were met.

- **Blanks**

  Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation or analysis. At least one method blank analysis must be conducted for every 20 samples. Method blanks should not contain target compounds at a concentration greater than CRQL. If target compounds are present, sample results less than five times the blank concentration are qualified as undetected and flagged "U". If the sample result is less than five times the blank concentration and less than CRQL, the result is qualified as undetected and elevated to the CRQL.

  All method blank target compound results were acceptable.

- **Accuracy**

  Matrix Spike

  Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike analyses are performed in duplicate and must be within control limits of 70% to 130%. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Nondetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

Due to the matrix spike/matrix spike duplicate being diluted out of the samples, all PCB results were qualified as estimates and flagged "J".

Surrogate Recovery

The analysis of surrogate compounds provides a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory. When a surrogate compound recovery is outside the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Nondetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Nondetected compounds with surrogate recoveries above the upper control limit require no qualification.

Due to the surrogate being diluted out of the sample, all undetected PCB results in samples B0WMD1, B0WMD2, B0WMD3, B0WMD4 and B0WMD5 were rejected and flagged "R" and all detected results were qualified as estimates and flagged "J".

All other surrogate results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed as the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. The RPD for solid samples is ≤30% for soils. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

Due to the matrix spike/matrix spike duplicate being diluted out of the samples, all PCB results were qualified as estimates and flagged "J".

Field Duplicate Samples

One pair of field duplicate samples (samples B0WMD1/B0WMD2) were submitted to RLN for analysis. The duplicate sample results were compared

using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

  Reported analytical detection levels are compared against the CRDL to ensure that laboratory detection levels meet the required criteria. The reported detection levels exceeded the CRDL for all analytes (except aroclor-1260) in samples B0WMD1, B0WMD2, B0WMD3, B0WMD4 and B0WMD5. Under the BHI statement of work, no qualification is required. All other reported laboratory detection levels were above the analyte specific CRDL.

- **Completeness**

  Data Package No. H0590-RLN (SDG No. H0590) was submitted for validation and verified for completeness. The completion percentage was 46%.

MAJOR DEFICIENCIES

Due to the surrogate being diluted out of the samples, all undetected PCB results in samples B0WMD1, B0WMD2, B0WMD3, B0WMD4 and B0WMD5 were rejected and flagged "R". Rejected data is unusable and should not be reported.

MINOR DEFICIENCIES

Due to the surrogate being diluted out of the samples, all detected PCB results in samples B0WMD1, B0WMD2, B0WMD3, B0WMD4 and B0WMD5 were qualified as estimates and flagged "J". Due to the matrix spike/matrix spike duplicate being diluted out of the samples, all PCB results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The reported detection levels exceeded the CRDL for all analytes (except aroclor-1260) in samples B0WMD1, B0WMD2, B0WMD3, B0WMD4 and B0WMD5. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-07, Draft B, *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0590	REVIEWER: TLI	DATE: 2/15/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242 Aroclor-1248, Aroclor-1254	R	B0WMD1, B0WMD2, B0WMD3, B0WMD4, B0WMD5	Surrogate diluted out
Aroclor-1260	J	B0WMD1, B0WMD2, B0WMD3, B0WMD4, B0WMD5	Surrogate diluted out
All	J	All	MS/MSD diluted out

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

PCB ANALYSIS, SOIL MATRIX, (UG/KG)

Project: BECHTEL-HANFORD																	
Laboratory: Recra LabNet																	
Case	SDG: H0590																
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8	
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond	
Remarks				Duplicate													
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
PCB	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aroclor-1016	100	3600	UR	3600	UR	720	UR	7400	UR	700	UR	36	UJ	34	UJ	35	UJ
Aroclor-1221	100	7200	UR	7200	UR	1400	UR	15000	UR	1400	UR	72	UJ	68	UJ	69	UJ
Aroclor-1232	100	3600	UR	3600	UR	720	UR	7400	UR	700	UR	36	UJ	34	UJ	35	UJ
Aroclor-1242	100	3600	UR	3600	UR	720	UR	7400	UR	700	UR	36	UJ	34	UJ	35	UJ
Aroclor-1248	100	3600	UR	3600	UR	720	UR	7400	UR	700	UR	36	UJ	34	UJ	35	UJ
Aroclor-1254	100	3600	UR	3600	UR	720	UR	7400	UR	700	UR	36	UJ	34	UJ	35	UJ
Aroclor-1260	100	9100	J	7700	J	1300	J	33000	J	2100	J	36	UJ	34	UJ	35	UJ

Recra LabNet - Lionville Laboratory

PCBs by GC

Report Date: 11/24/99 15:26

RFW Batch Number: 9910L501 Client: TNU-HANFORD B99-078 Work Order: 10985001001 Page: 1

004

	Cust ID:	BOWMD1	BOWMD1	BOWMD1	BOWMD2	BOWMD3	BOWMD4
Sample Information	RFW#:	001	001 MS	001 MSD	002	003	004
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	100	100	100	100	20.0	200
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate: Tetrachloro-m-xylene		D %	D %	D %	D %	D %	D %
Decachlorobiphenyl		D %	D %	D %	D %	D %	D %
Aroclor-1016		3600 U R	3600 U	3600 U	3600 U R	720 U R	7400 U R
Aroclor-1221		7200 U	7200 U	7100 U	7200 U	1400 U	15000 U
Aroclor-1232		3600 U	3600 U	3600 U	3600 U	720 U	7400 U
Aroclor-1242		3600 U	3600 U	3600 U	3600 U	720 U	7400 U
Aroclor-1248		3600 U	3600 U	3600 U	3600 U	720 U	7400 U
Aroclor-1254		3600 U	D %	D %	3600 U	720 U	7400 U
Aroclor-1260		9100 J	9000	8600	7700 J	1300 J	33000 J

	Cust ID:	BOWMD5	BOWMD6	BOWMD7	BOWMD8	PBLKYH	PBLKYH BS
Sample Information	RFW#:	005	006	007	008	99LE1303-MB1	99LE1303-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	20.0	1.00	1.00	1.00	1.00	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate: Tetrachloro-m-xylene		D %	92 %	92 %	102 %	92 %	95 %
Decachlorobiphenyl		D %	97 %	98 %	101 %	101 %	100 %
Aroclor-1016		700 U R	36 U J	34 U J	35 U J	33 U	33 U
Aroclor-1221		1400 U	72 U	68 U	69 U	67 U	67 U
Aroclor-1232		700 U	36 U	34 U	35 U	33 U	33 U
Aroclor-1242		700 U	36 U	34 U	35 U	33 U	33 U
Aroclor-1248		700 U	36 U	34 U	35 U	33 U	33 U
Aroclor-1254		700 U	36 U	34 U	35 U	33 U	82 %
Aroclor-1260		2100 J	36 U	34 U	35 U	33 U	33 U

0000142

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

11-26-99

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client: TNU-HANFORD B99-078
RFW#: 9910L501
SDG/SAF#: H0590/B99-078

W.O.#: 10985-001-001-9999-00
Date Received: 10-23-99

PCB

The set of samples consisted of eight (8) soil samples collected on 10-21-99.

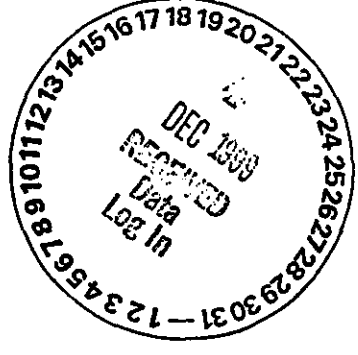
The samples and their associated QC samples were extracted on 10-26-99 and analyzed according to Recra OPs based on SW846, 3rd Edition procedures on 11-18,19,20,22-99. The extraction procedure was based on method 3540 and the extracts were analyzed based on method 8082 for Aroclors only.

The following is a summary of the QC results accompanying the sample results and a description of any problems encountered during their analyses:

1. The cooler temperature has been recorded on the chain-of-custody.
2. All required holding times for extraction and analysis have been met.
3. The samples and their associated QC samples received a sulfuric acid and sulfur cleanup.
4. The method blank was below the reporting limits for all target compounds.
5. All obtainable surrogate recoveries were within acceptance criteria.
6. The blank spike recovery was within acceptance criteria.
7. All matrix spike recoveries were within acceptance criteria.
8. Most samples required instrument dilutions due to high concentrations of target analytes. Reporting limits have been adjusted to reflect the necessary dilutions.
9. All initial calibrations associated with this data set were within acceptance criteria.
10. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.

for J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

11-30-99
Date



pef\r:\group\data\pest\10L501.pcb

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-144	Page 1 of 1

Collector Bowers/Trice	**Company Contact** Chris Cearlock **Telephone No.** 372-9574	**Project Coordinator** TRENT, SJ	**Price Code** 8N **Data Turnaround** 45 Days
Project Designation 200 Area Source characterization - 200-CW-1 OU	**Sampling Location** 200 B pond	**SAF No.** B99-078	
Ice Chest No. CERC 99 012 / ERC 99023	**Field Logbook No.** EL-1511	**Method of Shipment** FED EX	
Shipped To DOE/RECRA DB 10-21-99	**Offsite Property No.** N/A	**Bill of Lading/Air Bill No.** N/A	
		COA B20CW1671C	

POSSIBLE SAMPLE HAZARDS/REMARKS	**Preservation**	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
	Type of Container	aG	aG	aG	aG	aG	aG	aG			
Special Handling and/or Storage	**No. of Container(s)**	1	1	1	1	1	1	1			
	Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL			
SAMPLE ANALYSIS		Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			

Sample No.	Matrix *	Sample Date	Sample Time								
BOWMD1	Soil	10-21-99	1012		X	X	X	X	X		BOW999
BOWMD2	Soil	10-21-99	1017		X	X	X	X	X		BOW999
BOWMD3	Soil	10-21-99	1047		X	X	X	X	X		BOW9910
BOWMD4	Soil	10-21-99	1102		X	X	X	X	X		BOW9910
BOWMD5	Soil	10-21-99	1118	RF	X	X	X	X	X		BOW9909 Field Samples

CHAIN OF POSSESSION	Sign/Print Names		
	Relinquished By / Date/Time	Received By / Date/Time	
1	Doug Bowers 10-21-99/1400	Ref 3C 10-21-99/1400	
2	Ref 3C - 10-22-99 0800	[illegible] 10-22-99 0800	
3	[illegible] 10-22-99 1330	Fed Ex	
4	Fed Ex 10/23/99 1000	[illegible] 10-23-99 1000	

10-22-99

SPECIAL INSTRUCTIONS
See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0000145

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-145	Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock / Telephone No.: 372-9574	Project Coordinator: TRENT, SJ	Price Code 8N / Data Turnaround: 45 Days
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond	SAF No.: B99-078	
Ice Chest No.: ERC 96.025	Field Logbook No.: EL-1511	Method of Shipment: FED EX	
Shipped To: TMA/RECRA	Offsite Property No.: A ØØ 0 ØØ 5	Bill of Lading/Air Bill No.: 42357953 Ø966	
		COA: B20CW1 671C	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

000137

SAMPLE ANALYSIS				Isotopic Uranium	Nickel-63	Technetium-99	Tritium - H3	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.
Preservation				None	None	None	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None
Type of Container				aG	aG	aG	aG	aG	aG	aG	aG	aG	aG
No. of Container(s)				1	1	1	1	1	1	1	1	1	1
Volume				60mL	60mL	60mL	120mL	250mL	250mL	500mL	500mL	1000mL	1000mL
Sample No.	Matrix *	Sample Date	Sample Time										
B0WMD6	Soil	10-21-99	1130					X	X	X	X	X	
B0WMD7	Soil	10-21-99	1140					X	X	X	X	X	
B0WMD8	Soil	10-21-99	1150					X	X	X	X	X	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Dave Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Ref 3C	10-22-99/0800	R.Thoren/Rikki Thoren	10-22-99 0800
Rikki Thoren / R.Thoren	10-22-99 1430	FED EX	
Fed Ex	10-23-99 1000	[signature]	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; ICP Metals - 6010A (Supertrace Add-On) {Beryllium, Copper, Nickel, Vanadium, Zinc}; Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 {Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241}; Strontium-89,90 -- Total Sr; Total Uranium {Uranium}; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Americium-241

use B0W8C1 as TA. to ship

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION	Received By	Title: 9910L501	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-144	Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock — Telephone No.: 372-9574	Project Coordinator: TRENT, SJ	Price Code: 8N — Data Turnaround: 45 Days
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond	SAF No.: B99-078	
Ice Chest No.: ERC 96-025	Field Logbook No.: EL-1511	Method of Shipment: FED EX	
Shipped To: TMA/REDRA $ 10-21-99	Offsite Property No.: A000095	Bill of Lading/Air Bill No.: 42357953 09466	
		COA: B20CW1 671C	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

2T0001

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	Preservation	Type of Container	No. of Container(s) / Volume	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			
				None	aG	1 / 60mL										
				Cool 4C	aG	1 / 250mL										
				None	aG	1 / 250mL										
				Cool 4C	aG	1 / 500mL										
				Cool 4C	aG	1 / 500mL										
				Cool 4C	aG	1 / 1000mL										
				None	aG	1 / 1000mL										
BOWMD1	Soil	10-21-99	1012				X						X	BOWMT9		
BOWMD2	Soil	10-21-99	1017				X						X	BOWMT9		
BOWMD3	Soil	10-21-99	1047				X						X	BOWMW0		
BOWMD4	Soil	10-21-99	1102				X						X	BOWMW0		
BOWMD5	Soil	10-21-99	1118				X						X	BOWMD9		

CHAIN OF POSSESSION

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	10-21-99/1700	Ref 3C	10-21-99/1400
Ref 3C	10-22-99/0800	Rikki Thorer	10-22-99/0800
Rikki Thorer	10-22-99/1430	FED EX	
Fed Ex	10-23-99 1000	Cindy Cox	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

PESTICIDE/PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 200-CW-1			DATA PACKAGE: H0590		
VALIDATOR: TL		LAB: RCRA		DATE: 1/31/00	
CASE:			SDG: H0590		
ANALYSES PERFORMED					
☐ CLP3/90	☐ SW-846 8080	☐ SW-846 8081	☒ 8082	☐	☐
SAMPLES/MATRIX	BOWMD1	BOWMD2	BOWMD3	BOWMD4	
	BOWMD5	BOWMD6	BOWMD7	BOWMD8	
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

3.1 INSTRUMENT PERFORMANCE (METHOD 8080 AND 8081)

Are DDT retention times acceptable . . . . . Yes No (N/A)

Are calibration standard retention times acceptable? . . . . . Yes No (N/A)

Are DDT and endrin breakdowns acceptable? . . . . . Yes No (N/A)

PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are DBC retention times acceptable? . . . . . Yes No N/A
Is the GC/MS tuning/performance check acceptable? . . . . . Yes No N/A
Comments:

3.2 CALIBRATIONS (METHOD 8080 AND 8081)

Are EVAL standard calibration factors and %RSD values acceptable? . . . . . Yes No N/A
Are quantitation column calibration factor %RSD values acceptable? . . . . . Yes No N/A
Were the analytical sequence requirements met? . . . . . Yes No N/A
Are continuing calibration %D values acceptable? . . . . . Yes No N/A
Comments:

3.3 INSTRUMENT PERFORMANCE AND INITIAL CALIBRATION (3/90 SOW)

Was the initial calibration sequence performed? . . . . . Yes No N/A
Was the resolution acceptable in the resolution check mix? . . Yes No N/A
Is resolution acceptable in the PEM, INDA and INDB? . . . . . Yes No N/A
Are DDT and Endrin breakdowns acceptable? . . . . . Yes No N/A
Are retention times in PEMs and calibration mixes acceptable? . Yes No N/A
Are RPD values in the PEMs acceptable? . . . . . Yes No N/A
Are %RSD values acceptable? . . . . . Yes No N/A
Comments:

3.4 CALIBRATION VERIFICATION (3/90 SOW)

Were the analytical sequence requirements met? . . . . . Yes No N/A
Is resolution acceptable in the PEMs? . . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A

PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are retention times acceptable in the PEMs, INDA and INDB mixes?	Yes	No	N/A
Are RPD values in the PEMs acceptable?	Yes	No	N/A
Are the DDT and endrin breakdowns acceptable?	Yes	No	N/A
Was GPC cleanup performed?	Yes	No	N/A
Is the GPC calibration check acceptable?	Yes	No	N/A
Was Florisil cleanup performed?	Yes	No	N/A
Is the Florisil performance check acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were laboratory blanks analyzed?	Yes	No	N/A
Are laboratory blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments:

5. ACCURACY

Were surrogates analyzed?	Yes	No	N/A
Are surrogate recoveries acceptable?	Yes	No	N/A
Were MS/MSD samples analyzed?	Yes	No	N/A
Are MS/MSD results acceptable?	Yes	No	N/A
Were LCS samples analyzed?	Yes	No	N/A
Are LCS results acceptable?	Yes	No	N/A

Comments: D1-DS surr dil out - R
D.l out MS/MSD - J all

PESTICIDE/PCB DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? . . . . Yes **(No)** N/A

Are laboratory duplicate results acceptable? . . . . Yes No **(N/A)**

Are field duplicate RPD values acceptable? . . . . **(Yes)** ~~(No)~~ N/A

Are field split RPD values acceptable? . . . . Yes No **(N/A)**

Comments: Jall - No MS/MSD - diluted 90

~~FD Barium 31% ccd 57%, Hg 57%~~

7. SYSTEM PERFORMANCE

Is chromatographic performance acceptable? . . . . Yes No **(N/A)**

Are positive results resolved acceptably? . . . . Yes No **(N/A)**

Comments:

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . Yes No **(N/A)**

Is compound quantitation acceptable? . . . . Yes No **(N/A)**

Comments:

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? . . . . **(Yes)** No N/A

Are all results supported in the raw data? . . . . Yes No **(N/A)**

Do results meet the CRQLs? . . . . Yes **(No)** N/A

Comments: all cren 1-5

Date: 15 February 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 200 Area Source Characterization - 200-CW-1 Operable Unit
Subject: Semivolatiles - Data Package No. H0590-RLN (SDG No. H0590)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0590-RLN prepared by Recra LabNet (RLN). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B0WMD1	10/21/99	Soil	C	See note 1
B0WMD2	10/21/99	Soil	C	See note 1
B0WMD3	10/21/99	Soil	C	See note 1
B0WMD4	10/21/99	Soil	C	See note 1
B0WMD5	10/21/99	Soil	C	See note 1
B0WMD6	10/21/99	Soil	C	See note 1
B0WMD7	10/21/99	Soil	C	See note 1
B0WMD8	10/21/99	Soil	C	See note 1

1 - Semivolatiles by EPA 8270B

Data validation was conducted in accordance with the BHI validation statement of work and the *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*, DOE/RL-99-07, Draft B. Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

  If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

  All holding times were met.

- **Blanks**

  Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected ,"U".

  All method blank results were acceptable.

- **Accuracy**

  <u>Matrix Spike/Matrix Spike Duplicate Recoveries</u>

  Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 70% to 130%. If spike recoveries are

outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

Due to a matrix spike recovery of 56% and matrix spike duplicate recovery of 61%, all phenol, 2-methylphenol, 4-methylphenol, 2,4-dimethylphenol, dimethylphthalate, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, and isophorone were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 66%, all pentachlorphenol, 2,4,6-trichlorophenol and 2,4,5-trichlorophenol results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 63% and a matrix spike duplicate recovery of 67%, all 1,3,-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, hexachloroethane, hexachlorobutadiene and hexaclorocyclopentadiene results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 64% and a matrix spike duplicate recovery of 69%, all 2-chlorophenol, 2,4-dichlorophenol, 4-chloro-3-methylphenol, bis(2-chloroethyl)ether, bis(2-chloroethoxy)methane, 4-chorophenyl phenyl ether, and 4-bromophenyl phenyl ether results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the CRQL are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All sample surrogate recovery results were acceptable.

- **Precision**

  Matrix Spike/Matrix Spike Duplicate Samples

  Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results for solid samples must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

  All MS/MSD RPD results were acceptable.

  Field Duplicate Samples

  One pair of field duplicate samples (samples B0WMD1/B0WMD2) were submitted to RLN for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

  Reported analytical detection levels are compared against the CRDL to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels were above the analyte specific PQL. Under the BHI statement of work, no qualification is required.

- **Completeness**

Data package No. H0590 was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to a matrix spike recovery of 56% anda matrix spike duplicate recovery of 61%, all phenol, 2-methylphenol, 4-methylphenol, 2,4-dimethylphenol, dimethylphthalate, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, and isophorone were qualified as estimates and flagged "J". Due to a matrix spike recovery of 66%, all pentachlorphenol, 2,4,6-trichlorophenol and 2,4,5-trichlorophenol results were qualified as estimates and flagged "J". Due to a matrix spike recovery of 63% and a matrix spike duplicate recovery of 67%, all 1,3,-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, hexachloroethane, hexachlorobutadiene and hexaclorocyclopentadiene results were qualified as estimates and flagged "J". Due to a matrix spike recovery of 64% and a matrix spike duplicate recovery of 69%, all 2-chlorophenol, 2,4-dichlorophenol, 4-chloro-3-methylphenol, bis(2-chloroethyl)ether, bis(2-chloroethoxy)methane, 4-chorophenyl phenyl ether, and 4-bromophenyl phenyl ether results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

All reported laboratory detection levels were above the analyte specific PQL. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-07, Draft B, *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0590	REVIEWER: TLI	DATE: 2/15/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
phenol, 2-methylphenol, 4-methylphenol, 2,4-dimethylphenol, dimethylphthalate, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, isophorone, pentachlorphenol, 2,4,6-trichlorophenol 2,4,5-trichlorophenol 1,3,-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, hexachloroethane, hexachlorobutadiene hexaclorocyclopentadiene 2-chlorophenol, 2,4-dichlorophenol, 4-chloro-3-methylphenol,. bis(2-chloroethyl)ether, bis(2-chloroethoxy)methane, 4-chorophenyl phenyl ether, 4-bromophenyl phenyl ether	J	All	MS/MSD percent recovery

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

SEMIVOLATILE ANALYSIS, SOIL MATRIX, (UG/KG)

Project: BECHTEL-HANFORD																	
Laboratory: RECRA LabNet																	
Case:	SDG: H0590																
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8	
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond	
Remarks				Duplicate													
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
Extraction Date		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99	
Analysis Date		11/5/99		11/5/99		11/3/99		11/5/99		11/3/99		11/4/99		11/4/99		11/4/99	
Semivolatile (8270B)	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Phenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
bis(2-Chloroethyl)ether	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2-Chlorophenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
1,3-Dichlorobenzene	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
1,4-Dichlorobenzene	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
1,2-Dichlorobenzene	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2-Methylphenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2,2'-oxybis(1-Chloropropane)	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
4-Methylphenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
N-Nitroso-di-n-propylamine	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Hexachloroethane	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
Nitrobenzene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Isophorone	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2-Nitrophenol	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
2,4-Dimethylphenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
bis(2-Chloroethoxy)methane	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2,4-Dichlorophenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
1,2,4-Trichlorobenzene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Naphthalene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
4-Chloroaniline	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Hexachlorobutadiene	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
4-Chloro-3-methylphenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2-Methylnaphthalene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Hexachlorocyclopentadiene	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2,4,6-Trichlorophenol	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
2,4,5-Trichlorophenol	800	900	UJ	900	UJ	900	UJ	4600	UJ	880	UJ	900	UJ	860	UJ	870	UJ
2-Chloronaphthalene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
2-Nitroaniline	800	920	U	900	U	900	U	4600	U	880	U	900	U	860	U	870	U
Dimethylphthalate	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
Acenaphthylene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
2,6-Dinitrotoluene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U

SEMIVOLATILE ANALYSIS, SOIL MATRIX, (UG/KG) Page__2__ of__2__

Project: BECHTEL-HANFORD																	
Laboratory: RECRA LabNet																	
Case:	SDG: H0590																
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8	
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond	
Remarks				Duplicate													
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
Extraction Date		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99	
Analysis Date		11/5/99		11/5/99		11/3/99		11/5/99		11/3/99		11/4/99		11/4/99		11/4/99	
Semivolatile (8270B)	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
3-Nitroaniline	800	920	U	900	U	900	U	4600	U	880	U	900	U	860	U	870	U
Acenaphthene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
2,4-Dinitrophenol	800	920	U	900	U	900	U	4600	U	880	U	900	U	860	U	870	U
4-Nitrophenol	800	920	U	900	U	900	U	4600	U	880	U	900	U	860	U	870	U
Dibenzofuran	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
2,4-Dinitrotoluene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Diethylphthalate	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
4-Chlorophenyl-phenyl ether	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
Fluorene	330	360	U	360	U	360	U	4600	U	880	U	360	U	350	U	350	U
4-Nitroaniline	800	900	U	900	U	900	U	4600	U	880	U	900	U	860	U	870	U
4,6-Dinitro-2-methylphenol	800	920	U	900	U	900	U	4600	U	880	U	900	U	860	U	870	U
N-Nitrosodiphenylamine	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
4-Bromophenyl-phenyl ether	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
Hexachlorobenzene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Pentachlorophenol	800	900	UJ	900	UJ	900	UJ	4600	UJ	880	UJ	900	UJ	860	UJ	870	UJ
Phenanthrene	330	92		81		360	U	1900	U	33		360	U	350	U	350	U
Anthracene	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Carbazole	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Di-n-butylphthalate	330	68	J	55	J	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
Fluoranthene	330	190		180		360	U	1900	U	89		360	U	350	U	350	U
Pyrene	330	190		180		360	U	1900	U	92		360	U	350	U	350	U
Butylbenzylphthalate	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	UJ
3,3'-Dichlorobenzidine	330	360	U	360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Benzo(a)anthracene	330	64		63		360	U	1900	U	44		360	U	350	U	350	U
Chrysene	330	120		120		360	U	1900	U	62		360	U	350	U	350	U
bis(2-Ethylhexyl)phthalate	330	71	J	53	J	72	J	2000	J	110	J	360	UJ	350	UJ	350	UJ
Di-n-octylphthalate	330	360	UJ	360	UJ	360	UJ	1900	UJ	350	UJ	360	UJ	350	UJ	350	U
Benzo(b)fluoranthene	330	110		74		360	U	1900	U	37		360	U	350	U	350	U
Benzo(k)fluoranthene	330	120		82		360	U	1900	U	51		360	U	350	U	350	U
Benzo(a)pyrene	330	91		80		360	U	1900	U	56		360	U	350	U	350	U
Indeno(1,2,3-cd)pyrene	330	61		60		360	U	1900	U	34		360	U	350	U	350	U
Dibenz(a,h)anthracene	330	22		360	U	360	U	1900	U	350	U	360	U	350	U	350	U
Benzo(g,h,i)perylene	330	75		61		360	U	1900	U	38		360	U	350	U	350	U

04

	Cust ID:	BOWMD1	BOWMD1	BOWMD1	BOWMD2	BOWMD3	BOWMD4
Sample Information	RFW#:	001	001 MS	001 MSD	002	003	004
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	5.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate Recovery	Nitrobenzene-d5	66 %	65 %	72 %	65 %	70 %	58 %
	2-Fluorobiphenyl	72 %	71 %	81 %	75 %	78 %	67 %
	Terphenyl-d14	75 %	77 %	88 %	79 %	78 %	71 %
	Phenol-d5	55 %	57 %	63 %	57 %	56 %	46 %
	2-Fluorophenol	59 %	60 %	66 %	61 %	62 %	53 %
	2,4,6-Tribromophenol	68 %	72 %	82 %	70 %	66 %	48 %
		fl	fl	fl	fl	fl	fl
Phenol		360 U J	56 %	61 %	360 U J	360 U J	1900 U J
bis(2-Chloroethyl)ether		360 U J	360 U	360 U	360 U	360 U	1900 U
2-Chlorophenol		360 U J	64 %	69 %	360 U	360 U	1900 U
1,3-Dichlorobenzene		360 U J	360 U	360 U	360 U	360 U	1900 U
1,4-Dichlorobenzene		360 U J	63 %	67 %	360 U	360 U	1900 U
1,2-Dichlorobenzene		360 U J	360 U	360 U	360 U	360 U	1900 U
2-Methylphenol		360 U J	360 U	360 U	360 U	360 U	1900 U
2,2'-oxybis(1-Chloropropane)		360 U	360 U	360 U	360 U	360 U	1900 U
4-Methylphenol		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
N-Nitroso-di-n-propylamine		360 U	70 %	74 %	360 U	360 U	1900 U
Hexachloroethane		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
Nitrobenzene		360 U	360 U	360 U	360 U	360 U	1900 U
Isophorone		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
2-Nitrophenol		360 U	360 U	360 U	360 U	360 U	1900 U
2,4-Dimethylphenol		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
bis(2-Chloroethoxy)methane		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
2,4-Dichlorophenol		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
1,2,4-Trichlorobenzene		360 U	74 %	79 %	360 U	360 U	1900 U
Naphthalene		360 U	360 U	360 U	360 U	360 U	1900 U
4-Chloroaniline		360 U	360 U	360 U	360 U	360 U	1900 U
Hexachlorobutadiene		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
4-Chloro-3-methylphenol		360 U J	70 %	75 %	360 U J	360 U J	1900 U J
2-Methylnaphthalene		360 U	360 U	360 U	360 U	360 U	1900 U
Hexachlorocyclopentadiene		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
2,4,6-Trichlorophenol		360 U J	360 U	360 U	360 U J	360 U J	1900 U J
2,4,5-Trichlorophenol		900 U J	900 U	900 U	900 U J	900 U J	4600 U J

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9910L501 Client: TNU-HANFORD B99-078 Work Order: 10985001001 Page: 1b

Cust ID:	BOWMD1	BOWMD1	BOWMD1	BOWMD2	BOWMD3	BOWMD4
RFW#:	001	001 MS	001 MSD	002	003	004
2-Chloronaphthalene	360 U	360 U	360 U	360 U	360 U	1900 U
2-Nitroaniline	900 U	900 U	900 U	900 U	900 U	4600 U
Dimethylphthalate	360 U	360 U	360 U	360 U	360 U	1900 U
Acenaphthylene	360 U	360 U	360 U	360 U	360 U	1900 U
2,6-Dinitrotoluene	360 U	360 U	360 U	360 U	360 U	1900 U
3-Nitroaniline	900 U	900 U	900 U	900 U	900 U	4600 U
Acenaphthene	360 U	76 %	83 %	360 U	360 U	1900 U
2,4-Dinitrophenol	900 U	900 U	900 U	900 U	900 U	4600 U
4-Nitrophenol	900 U	71 %	77 %	900 U	900 U	4600 U
Dibenzofuran	360 U	360 U	360 U	360 U	360 U	1900 U
2,4-Dinitrotoluene	360 U	71 %	79 %	360 U	360 U	1900 U
Diethylphthalate	360 U	360 U	360 U	360 U	360 U	1900 U
4-Chlorophenyl-phenylether	360 U J	360 U	360 U	360 U J	360 U J	1900 U J
Fluorene	360 U	360 U	360 U	360 U	360 U	1900 U
4-Nitroaniline	900 U	900 U	900 U	900 U	900 U	4600 U
4,6-Dinitro-2-methylphenol	900 U	900 U	900 U	900 U	900 U	4600 U
N-Nitrosodiphenylamine (1)	360 U	360 U	360 U	360 U	360 U	1900 U
4-Bromophenyl-phenylether	360 U J	360 U	360 U	360 U J	360 U J	1900 U J
Hexachlorobenzene	360 U	360 U	360 U	360 U	360 U	1900 U
Pentachlorophenol	900 U J	66 %	76 %	900 U J	900 U J	4600 U J
Phenanthrene	92 J	70 J	88 J	81 J	360 U	1900 U
Anthracene	360 U	360 U	360 U	360 U	360 U	1900 U
Carbazole	360 U	360 U	360 U	360 U	360 U	1900 U
Di-n-butylphthalate	68 J J	57 J	56 J	55 J J	360 U J	1900 U J
Fluoranthene	190 J	140 J	170 J	180 J	360 U	1900 U
Pyrene	190 J	80 %	92 %	180 J	360 U	1900 U
Butylbenzylphthalate	360 U J	360 U	360 U	360 U J	360 U J	1900 U J
3,3'-Dichlorobenzidine	360 U	360 U	360 U	360 U	360 U	1900 U
Benzo(a)anthracene	64 J	44 J	58 J	63 J	360 U	1900 U
Chrysene	120 J	100 J	110 J	120 J	360 U	1900 U
bis(2-Ethylhexyl)phthalate	71 J J	97 J	130 J	53 J J	72 J J	2000 J
Di-n-octyl phthalate	360 U J	360 U	360 U	360 U J	360 U J	1900 U J
Benzo(b)fluoranthene	110 J	92 J	95 J	74 J	360 U	1900 U
Benzo(k)fluoranthene	120 J	82 J	100 J	82 J	360 U	1900 U
Benzo(a)pyrene	91 J	100 J	88 J	80 J	360 U	1900 U
Indeno(1,2,3-cd)pyrene	61 J	69 J	59 J	60 J	360 U	1900 U
Dibenz(a,h)anthracene	22 J	28 J	22 J	360 U	360 U	1900 U
Benzo(g,h,i)perylene	75 J	83 J	64 J	61 J	360 U	1900 U

(1) - Cannot be separated from Diphenylamine. *= Outside of EPA CLP QC limits.

	Cust ID:	BOWMD5	BOWMD6	BOWMD7	BOWMD8	SBLKFK	SBLKFK BS
Sample Information	RFW#:	005	006	007	008	99LE1313-MB1	99LE1313-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate Recovery	Nitrobenzene-d5	68 %	72 %	76 %	78 %	71 %	67 %
	2-Fluorobiphenyl	75 %	76 %	80 %	82 %	78 %	74 %
	Terphenyl-d14	75 %	82 %	83 %	86 %	77 %	71 %
	Phenol-d5	59 %	57 %	56 %	61 %	56 %	49 %
	2-Fluorophenol	63 %	60 %	60 %	65 %	59 %	55 %
	2,4,6-Tribromophenol	60 %	51 %	47 %	60 %	62 %	54 %
Phenol		350 U J	360 U J	350 U J	350 U J	330 U	49 %
bis(2-Chloroethyl)ether		350 U	360 U	350 U	350 U	330 U	330 U
2-Chlorophenol		350 U	360 U	350 U	350 U	330 U	56 %
1,3-Dichlorobenzene		350 U	360 U	350 U	350 U	330 U	330 U
1,4-Dichlorobenzene		350 U	360 U	350 U	350 U	330 U	68 %
1,2-Dichlorobenzene		350 U	360 U	350 U	350 U	330 U	330 U
2-Methylphenol		350 U	360 U	350 U	350 U	330 U	330 U
2,2'-oxybis(1-Chloropropane)		350 U	360 U	350 U	350 U	330 U	330 U
4-Methylphenol		350 U J	360 U J	350 U J	350 U J	330 U	330 U
N-Nitroso-di-n-propylamine		350 U	360 U	350 U	350 U	330 U	61 %
Hexachloroethane		350 U J	360 U J	350 U J	350 U J	330 U	330 U
Nitrobenzene		350 U	360 U	350 U	350 U	330 U	330 U
Isophorone		350 U J	360 U J	350 U J	350 U J	330 U	330 U
2-Nitrophenol		350 U	360 U	350 U	350 U	330 U	330 U
2,4-Dimethylphenol		350 U J	360 U J	350 U J	350 U J	330 U	330 U
bis(2-Chloroethoxy)methane		350 U J	360 U J	350 U J	350 U J	330 U	330 U
2,4-Dichlorophenol		350 U J	360 U J	350 U J	350 U J	330 U	330 U
1,2,4-Trichlorobenzene		350 U	360 U	350 U	350 U	330 U	81 %
Naphthalene		350 U	360 U	350 U	350 U	330 U	330 U
4-Chloroaniline		350 U	360 U	350 U	350 U	330 U	330 U
Hexachlorobutadiene		350 U J	360 U J	350 U J	350 U J	330 U	330 U
4-Chloro-3-methylphenol		350 U J	360 U J	350 U J	350 U J	330 U	49 %
2-Methylnaphthalene		350 U	360 U	350 U	350 U	330 U	330 U
Hexachlorocyclopentadiene		350 U J	360 U J	350 U J	350 U J	330 U	330 U
2,4,6-Trichlorophenol		350 U J	360 U J	350 U J	350 U J	330 U	330 U
2,4,5-Trichlorophenol		880 U J	900 U J	860 U J	870 U J	840 U	840 U

*= Outside of EPA CLP QC limits.

0000015

Cust ID:	BOWMD5	BOWMD6	BOWMD7	BOWMD8	SBLKFK	SBLKFK BS
RFW#:	005	006	007	008	99LE1313-MB1	99LE1313-MB1
2-Chloronaphthalene	350 U	360 U	350 U	350 U	330 U	330 U
2-Nitroaniline	880 U	900 U	860 U	870 U	840 U	840 U
Dimethylphthalate	350 U	360 U	350 U	350 U	330 U	330 U
Acenaphthylene	350 U	360 U	350 U	350 U	330 U	330 U
2,6-Dinitrotoluene	350 U	360 U	350 U	350 U	330 U	330 U
3-Nitroaniline	880 U	900 U	860 U	870 U	840 U	840 U
Acenaphthene	350 U	360 U	350 U	350 U	330 U	71 %
2,4-Dinitrophenol	880 U	900 U	860 U	870 U	840 U	840 U
4-Nitrophenol	880 U	900 U	860 U	870 U	840 U	50 %
Dibenzofuran	350 U	360 U	350 U	350 U	330 U	330 U
2,4-Dinitrotoluene	350 U	360 U	350 U	350 U	330 U	58 %
Diethylphthalate	350 U	360 U	350 U	350 U	330 U	330 U
4-Chlorophenyl-phenylether	350 U	360 U	350 U	350 U	330 U	330 U
Fluorene	350 U	360 U	350 U	350 U	330 U	330 U
4-Nitroaniline	880 U	900 U	860 U	870 U	840 U	840 U
4,6-Dinitro-2-methylphenol	880 U	900 U	860 U	870 U	840 U	840 U
N-Nitrosodiphenylamine (1)	350 U	360 U	350 U	350 U	330 U	330 U
4-Bromophenyl-phenylether	350 U	360 U	350 U	350 U	330 U	330 U
Hexachlorobenzene	350 U	360 U	350 U	350 U	330 U	330 U
Pentachlorophenol	880 U	900 U	860 U	870 U	840 U	60 %
Phenanthrene	33 J	360 U	350 U	350 U	330 U	330 U
Anthracene	350 U	360 U	350 U	350 U	330 U	330 U
Carbazole	350 U	360 U	350 U	350 U	330 U	330 U
Di-n-butylphthalate	350 U	360 U	350 U	350 U	330 U	330 U
Fluoranthene	89 J	360 U	350 U	350 U	330 U	330 U
Pyrene	92 J	360 U	350 U	350 U	330 U	71 %
Butylbenzylphthalate	350 U	360 U	350 U	350 U	330 U	330 U
3,3'-Dichlorobenzidine	350 U	360 U	350 U	350 U	330 U	330 U
Benzo(a)anthracene	44 J	360 U	350 U	350 U	330 U	330 U
Chrysene	62 J	360 U	350 U	350 U	330 U	330 U
bis(2-Ethylhexyl)phthalate	110 J	360 U	350 U	350 U	330 U	330 U
Di-n-octyl phthalate	350 U	360 U	350 U	350 U	330 U	330 U
Benzo(b)fluoranthene	37 J	360 U	350 U	350 U	330 U	330 U
Benzo(k)fluoranthene	51 J	360 U	350 U	350 U	330 U	330 U
Benzo(a)pyrene	56 J	360 U	350 U	350 U	330 U	330 U
Indeno(1,2,3-cd)pyrene	34 J	360 U	350 U	350 U	330 U	330 U
Dibenz(a,h)anthracene	350 U	360 U	350 U	350 U	330 U	330 U
Benzo(g,h,i)perylene	38 J	360 U	350 U	350 U	330 U	330 U

(1) - Cannot be separated from Diphenylamine. *= Outside of EPA CLP QC limits.

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report
****REVISION****

Client : TNU-HANFORD B99-078
RFW # : 9910L501
SDG/SAF #: H0590/B99-078

W.O. #: 10985-001-001-9999-00
Date Received: 10-23-99

SEMIVOLATILE

This narrative was corrected to add the TIC search for Tributylphosphate.

Eight (8) soil samples were collected on 10-21-99.

The samples and their associated QC samples were extracted on 10-28-99 and analyzed according to criteria set forth in Recra OPs based on SW 846 Method 8270B for TCL Semivolatile target compounds on 11-03,04,05-99.

The following is a summary of the QC results accompanying the sample results and a description of any problems encountered during their analyses:

1. The cooler temperatures upon receipt have been recorded on the chain-of-custody.
2. The required holding times for extraction and analysis were met.
3. Non-target compounds were detected in the samples.
4. Sample B0WMD4 required a 5-fold dilution due to high levels of both target and non-target compounds.
5. All surrogate recoveries were within EPA QC limits.
6. All matrix spike recoveries were within EPA QC limits.
7. All blank spike recoveries were within EPA QC limits.
8. The sample was spectrally searched for Butylated Hydroxytoluene and Tributylphosphate; however, they were not identified in the samples.

by _____ 01-17-00

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

Date

som\gorup\data\bna\tnu10501.doc

OR

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-144	Page 1 of 1

Collector Bowers/Trice	Company Contact Chris Cearlock	Telephone No. 372-9574	Project Coordinator TRENT, SJ	Price Code 8N
Project Designation 200 Area Source characterization - 200-CW-1 OU	Sampling Location 200 B pond		SAF No. B99-078	Data Turnaround 45 Days
Ice Chest No. ERC 99 012 / ERC 99 023	Field Logbook No. EL-1511		Method of Shipment FED EX	
Shipped To TMA/RECRA 10-21-99	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A	
			COA B20CW1 671C	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
Type of Container	aG	aG	aG	aG	aG	aG	aG			
No. of Container(s)	1	1	1	1	1	1	1			
Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL			
SAMPLE ANALYSIS	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			

Sample No.	Matrix *	Sample Date	Sample Time										
BOWMD1	Soil	10-21-99	1012		X	X	X	X	X		BOW9T9		
BOWMD2	Soil	10-21-99	1017		X	X	X	X	X		BOW9T9		
BOWMD3	Soil	10-21-99	1047		X	X	X	X	X		BOW9W0		
BOWMD4	Soil	10-21-99	1102		X	X	X	X	X		BOW9W0		
~~BOWMD5~~	~~Soil~~	~~10-21-99~~	~~1118~~ RF 10-22-99		~~X~~	~~X~~	~~X~~	~~X~~	~~X~~		~~BOW9T9~~ Rec'd 4 samples		

0000019
k
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8

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By Doug Bowers Date/Time Doug Bowers 10-21-99/1400	Received By Date/Time Ref 3C 10-21-99/1400		
Relinquished By Date/Time Ref 3C - 10-22-99 0800	Received By Date/Time 0800 R Fehlberg 10-22-99		
Relinquished By Date/Time 1330 R Fehlberg 10-22-99	Received By Date/Time Fed Ex		
Relinquished By Date/Time Fed Ex 10/23/99 1000	Received By Date/Time [signature] 10-23-99 1000		

SPECIAL INSTRUCTIONS
See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; ICP Metals - 6010A (Supertrace Add-On) {Beryllium, Copper, Nickel, Vanadium, Zinc}; Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 {Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241}; Strontium-89,90 -- Total Sr; Total Uranium {Uranium}; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Americium-241

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-145	Page 1 of 1

Collector Bowers/Trice	Company Contact Chris Cearlock	Telephone No. 372-9574	Project Coordinator TRENT, SJ
Project Designation 200 Area Source characterization - 200-CW-1 OU	Sampling Location 200 B pond		SAF No. B99-078
Ice Chest No. ERC 96-025	Field Logbook No. EL-1511		Method of Shipment FED EX
Shipped To TMA/RECRA B70 10-21-99	Offsite Property No. A000005		Bill of Lading/Air Bill No. 42357953 0966
			COA B20CW1 671C

Price Code 8N

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	None	None	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None
Type of Container	aG	aG	aG	aG	aG	aG	aG	aG	aG	aG
No. of Container(s)	1	1	1	1	1	1	1	1	1	1
Volume	60mL	60mL	60mL	120mL	250mL	250mL	500mL	500mL	1000mL	1000mL
SAMPLE ANALYSIS	Isotopic Uranium	Nickel-63	Technetium-99	Tritium - H3	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time										
B0WMD6	Soil	10-21-99	1130					X	X	X	X	X	
B0WMD7	Soil	10-21-99	1140					X	X	X	X	X	
B0WMD8	Soil	10-21-99	1150					X	X	X	X	X	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Dave Bowers / Dave Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Ref 3C	10-22-99/0800	R.Thoren/Rikki Thoren	10-22-99 0800
Rikki Thoren / R.Thoren	10-22-99 1430	FedEx	
Fed Ex	10-23-99 1000	[illegible signature]	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196

(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010

(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europitum-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

use B0W8C1 as TA to ship

Matrix *

Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title 9910L501	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0002050

000021

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | B99-078-144 | Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock / Telephone No. 372-9574	Project Coordinator: TRENT, SJ	Price Code 8N / Data Turnaround: 45 Days
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond	SAF No. B99-078	
Ice Chest No. ERC 96-025	Field Logbook No. EL-1511	Method of Shipment: FED EX	
Shipped To: TMA/RECRA 10-21-99	Offsite Property No. A000005	Bill of Lading/Air Bill No. 42357953 09666	
		COA B20CW1 671C	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
Type of Container	aG	aG	aG	aG	aG	aG	aG			
No. of Container(s)	1	1	1	1	1	1	1			
Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL			
SAMPLE ANALYSIS	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			

Sample No.	Matrix *	Sample Date	Sample Time										
BOWMD1	Soil	10-21-99	1012	X						X	BOW9T9		
BOWMD2	Soil	10-21-99	1017	X						X	BOW9W0 T9		
BOWMD3	Soil	10-21-99	1047	X						X DR 10-22-99	BOW9W0		
BOWMD4	Soil	10-21-99	1102	X						X	BOW9W0		
BOWMD5	Soil	10-21-99	1118	X						X	BOWMD9		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Ref 3C	10-22-99/0800	Rikki Thoren	10-22-99/0800
Rikki Thoren	10-22-99/1430	FEDEX	
FedEx	10-23-99 1000	Jody Cox	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196

(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010

(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-CW-1			DATA PACKAGE: HC590		
VALIDATOR: TLI		LAB: RECRA		DATE: 2/1/00	
CASE:			SDG: HS90		

ANALYSES PERFORMED

☐ CLP Volatiles	☐ SW-846 8240 (cap column)	☐ SW-846 8260 (packed column)	☐ CLP Semivolatiles	☑ SW-846 8270 (cap column)	☐ SW-846 (packed column)
☐	☐	☐	☐	☐	☐

SAMPLES/MATRIX BOWMD1 BOWMD2 BOWMD3
BOWMD4 BOWMD5 BOWMD6
BOWMD7 BOWMD8

dal

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

AGR

GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. INSTRUMENT TUNING AND CALIBRATION

Is the GC/MS tuning/performance check acceptable? . . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are continuing calibrations acceptable? . . . . . Yes No N/A
Comments:

4. BLANKS

Were laboratory blanks analyzed? . . . . . Yes No N/A
Are laboratory blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A
Comments:

5. ACCURACY

Were surrogates/System Monitoring Compounds analyzed? . . . . Yes No N/A
Are surrogate/System Monitoring Compound recoveries acceptable? Yes No N/A
Were MS/MSD samples analyzed? . . . . . Yes No N/A
Are MS/MSD results acceptable? . . . . . Yes No N/A
Comments: pentachlorophenol 66% (MS)
1,4 dichlorobenzene 63% (MS) 67% (MSD)
2-Chlorophenol 49% (MS) 69% (MSD)
phenol 56 " 61 "

GC/MS ORGANIC DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? . . . . . Yes No N/A
Are field duplicate RPD values acceptable? . . . . . Yes No ~~N/A~~
Are field split RPD values acceptable? . . . . . Yes No N/A
Comments: D1/D2 - lc

7. SYSTEM PERFORMANCE

Were internal standards analyzed? . . . . . Yes No N/A
Are internal standard areas acceptable? . . . . . Yes No N/A
Are internal standard retention times acceptable? . . . . . Yes No N/A
Comments:

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . . Yes No N/A
Is compound quantitation acceptable? . . . . . Yes No N/A
Comments:

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A
Are all results supported in the raw data? . . . . . Yes No ~~N/A~~
Do results meet the CRQLs? . . . . . Yes No N/A
Has the laboratory properly identified and coded all TIC? . . . Yes No N/A
Comments: all over

Date: 15 February 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 200 Area Source Characterization - 200-CW-1 Operable Unit
Subject: Wet Chemistry - Data Package No. H0590-RLN (SDG No. H0590)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0590-RLN prepared by Recra LabNet (RLN). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B0WMD1	10/21/99	Soil	C	See note 1
B0WMD2	10/21/99	Soil	C	See note 1
B0WMD3	10/21/99	Soil	C	See note 1
B0WMD4	10/21/99	Soil	C	See note 1
B0WMD5	10/21/99	Soil	C	See note 1
B0WMD6	10/21/99	Soil	C	See note 1
B0WMD7	10/21/99	Soil	C	See note 1
B0WMD8	10/21/99	Soil	C	See note 1

1 - IC Anions - 300.0 chloride, fluoride, nitrate, nitrite, phosphate, sulfate); ammonia - 350.3; cyanide - 9010B; pH - 9045; sulphide - 9030B; chromium-VI - 7196A; nitrate/nitrite - 353.2.

Data validation was conducted in accordance with the BHI validation statement of work and the *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*, DOE/RL-99-07, Draft B. Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times are assessed to ascertain whether the holding time requirements have been met by the laboratory. The holding time requirements are as follows: 30 days for chromium VI; 28 days for ammonia, nitrate/nitrite and IC anions (chloride, fluoride, and sulfate); 14 days for cyanide; 7 days for sulfide; 2 days for IC anion (phosphate, nitrate and nitrite); and immediate for pH.

  If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

  Holding times were met for all analytes.

- **Blanks**

  Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. All blank results must fall below the CRQL to be acceptable.

  All method blank results were acceptable.

- **Accuracy**

  Matrix Spike

  Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample value below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

- **Precision**

  Laboratory Duplicate Samples

  Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the PQL/CRQL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the PQL/CRQL and the sample concentration is less than five times the PQL/CRQL, all associated sample results are qualified as estimated and flagged "J/UJ".

  All laboratory duplicate results were within the required control limits.

  Field Duplicate Samples

  One pair of field duplicate samples (samples B0WMD1/B0WMD2) were submitted to RLN for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

  Reported analytical detection levels are compared against the CRDL to ensure that laboratory detection levels meet the required criteria. The following reported detection limits were above the CRDL: Fluoride and nitrite in all samples and ammonia in samples B0WMD2, B0WMD3, B0WMD5, B0WMD6, B0WMD7 and B0WMD8. Under the BHI statement of work, no qualification is required. All other reported laboratory detection levels met the analyte specific CRDL.

- **Completeness**

  Data Package No. H0590-RLN (SDG No. H0590) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following reported detection limits were above the CRDL: Fluoride and nitrite in all samples and ammonia in samples B0WMD2, B0WMD3, B0WMD5, B0WMD6, B0WMD7 and B0WMD8. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-07, Draft B, *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WHC procedures are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0590	REVIEWER: TLI	DATE: 2/15/00	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

GENERAL CHEMISTRY ANALYSIS, WATER MATRIX, (MG/KG) Page__1__of__1__

Project: BECHTEL-HANFORD																	
Laboratory: Recra LabNet																	
Case	SDG: H0590																
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8	
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond	
Remarks				Duplicate													
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
General Chemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chloride	2	5.4		5.8		3.5		8.3		3.0		3.1		2.6		2.4	
Fluoride	1	2.7	U	2.7	U	2.7	U	2.8	U	2.6	U	2.7	U	2.6	U	2.6	U
Nitrite	1	1.4	U	1.3	U	1.4	U	1.4	U	1.3	U	1.4	U	1.3	U	1.3	U
Nitrate	0.2	170		180		140		330		85		39		8.8		1.6	
Cyanide	1	0.54	U	0.54	U	0.54	U	0.56	U	0.53	U	0.54	U	0.52	U	0.52	U
Phosphate by IC	6	2.2		2.1		2.7		1.4	U	1.9		1.8		1.3	U	1.3	U
Chromium VI	0.7	0.43	U	0.43	U	0.65	U	0.45	U	0.42	U	0.44	U	0.42	U	0.42	U
Sulfate by IC	10	88.1		107		84.7		678		105		9.5		4.8		2.8	
Nitrate/Nitrite		37.5		35.8		22.0		70.7		20.9		8.6		2.0		0.31	
Ammonia	0.5	1.5		1.3	U	1.3	U	2.1		1.3	U	1.3	U	1.3	U	1.3	U
pH*		8.0		8.0		8.1		7.5		8.8		8.5		8.7		8.6	
Sulfide	20	4.2		4.2		4.2		4.2		2.1	U	2.2	U	2.1	U	3.9	
* - Units are pH units																	

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/06/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	BOWMD1	% Solids	92.2	%	0.01	1.0
		Chloride by IC	5.4	MG/KG	1.4	1.0
		Fluoride by IC	2.7 u	MG/KG	2.7	1.0
		Nitrite by IC	1.4 u	MG/KG	1.4	1.0
		Nitrate by IC	170	MG/KG	6.8	5.0
		Cyanide, Total	0.54 u	MG/KG	0.54	1.0
		Phosphate by IC	2.2	MG/KG	1.4	1.0
		Chromium VI	0.43 u	MG/KG	0.43	1.0
		Sulfate by IC	88.1	MG/KG	6.8	5.0
		Nitrate Nitrite	37.5	MG/KG	2.1	10.0
		Ammonia, as N	1.5	MG/KG	1.3	1.0
		pH	8.0	SOIL PH	0.01	1.0
		Sulfide	4.2	MG/KG	2.2	1.0
-002	BOWMD2	% Solids	92.6	%	0.01	1.0
		Chloride by IC	5.8	MG/KG	1.3	1.0
		Fluoride by IC	2.7 u	MG/KG	2.7	1.0
		Nitrite by IC	1.3 u	MG/KG	1.3	1.0
		Nitrate by IC	180	MG/KG	6.7	5.0
		Cyanide, Total	0.54 u	MG/KG	0.54	1.0
		Phosphate by IC	2.1	MG/KG	1.3	1.0
		Chromium VI	0.43 u	MG/KG	0.43	1.0
		Sulfate by IC	107	MG/KG	6.7	5.0
		Nitrate Nitrite	35.8	MG/KG	2.1	10.0
		Ammonia, as N	1.3 u	MG/KG	1.3	1.0
		pH	8.0	SOIL PH	0.01	1.0
		Sulfide	4.2	MG/KG	2.2	1.0
-003	BOWMD3	% Solids	92.0	%	0.01	1.0
		Chloride by IC	3.5	MG/KG	1.4	1.0
		Fluoride by IC	2.7 u	MG/KG	2.7	1.0
		Nitrite by IC	1.4 u	MG/KG	1.4	1.0
		Nitrate by IC	140	MG/KG	6.8	5.0
		Cyanide, Total	0.54 u	MG/KG	0.54	1.0
		Phosphate by IC	2.7	MG/KG	1.4	1.0
		Chromium VI	0.65 u	MG/KG	0.65	1.0
		Sulfate by IC	84.7	MG/KG	6.8	5.0
		Nitrate Nitrite	22.0	MG/KG	2.2	10.0
		Ammonia, as N	1.3 u	MG/KG	1.3	1.0
		pH	8.1	SOIL PH	0.01	1.0

2/11/00

~~004~~

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/06/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	BOWMD3	Sulfide	4.2	MG/KG	2.2	1.0
-004	BOWMD4	% Solids	89.5	%	0.01	1.0
		Chloride by IC	8.3	MG/KG	1.4	1.0
		Fluoride by IC	2.8 u	MG/KG	2.8	1.0
		Nitrite by IC	1.4 u	MG/KG	1.4	1.0
		Nitrate by IC	330	MG/KG	28	20
		Cyanide, Total	0.56 u	MG/KG	0.56	1.0
		Phosphate by IC	1.4 u	MG/KG	1.4	1.0
		Chromium VI	0.45 u	MG/KG	0.45	1.0
		Sulfate by IC	678	MG/KG	27.9	20.0
		Nitrate Nitrite	70.7	MG/KG	5.5	25.0
		Ammonia, as N	2.1	MG/KG	1.4	1.0
		pH	7.5	SOIL PH	0.01	1.0
		Sulfide	4.2	MG/KG	2.2	1.0
-005	BOWMD5	% Solids	94.6	%	0.01	1.0
		Chloride by IC	3.0	MG/KG	1.3	1.0
		Fluoride by IC	2.6 u	MG/KG	2.6	1.0
		Nitrite by IC	1.3 u	MG/KG	1.3	1.0
		Nitrate by IC	85	MG/KG	6.6	5.0
		Cyanide, Total	0.53 u	MG/KG	0.53	1.0
		Phosphate by IC	1.9	MG/KG	1.3	1.0
		Chromium VI	0.42 u	MG/KG	0.42	1.0
		Sulfate by IC	105	MG/KG	6.6	5.0
		Nitrate Nitrite	20.9	MG/KG	2.0	10.0
		Ammonia, as N	1.3 u	MG/KG	1.3	1.0
		pH	8.8	SOIL PH	0.01	1.0
		Sulfide	2.1 u	MG/KG	2.1	1.0
-006	BOWMD6	% Solids	91.9	%	0.01	1.0
		Chloride by IC	3.1	MG/KG	1.4	1.0
		Fluoride by IC	2.7 u	MG/KG	2.7	1.0
		Nitrite by IC	1.4 u	MG/KG	1.4	1.0
		Nitrate by IC	39	MG/KG	1.4	1.0
		Cyanide, Total	0.54 u	MG/KG	0.54	1.0
		Phosphate by IC	1.8	MG/KG	1.4	1.0
		Chromium VI	0.44 u	MG/KG	0.44	1.0
		Sulfate by IC	9.5	MG/KG	1.4	1.0
		Nitrate Nitrite	8.6	MG/KG	0.21	1.0

2/11/00

005

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 12/06/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-006	BOWMD6	Ammonia, as N	1.3	u	MG/KG	1.3	1.0
		pH	8.5		SOIL PH	0.01	1.0
		Sulfide	2.2	u	MG/KG	2.2	1.0
-007	BOWMD7	% Solids	96.2		%	0.01	1.0
		Chloride by IC	2.6		MG/KG	1.3	1.0
		Fluoride by IC	2.6	u	MG/KG	2.6	1.0
		Nitrite by IC	1.3	u	MG/KG	1.3	1.0
		Nitrate by IC	8.8		MG/KG	1.3	1.0
		Cyanide, Total	0.52	u	MG/KG	0.52	1.0
		Phosphate by IC	1.3	u	MG/KG	1.3	1.0
		Chromium VI	0.42	u	MG/KG	0.42	1.0
		Sulfate by IC	4.8		MG/KG	1.3	1.0
		Nitrate Nitrite	2.0		MG/KG	0.20	1.0
		Ammonia, as N	1.3	u	MG/KG	1.3	1.0
		pH	8.7		SOIL PH	0.01	1.0
		Sulfide	2.1	u	MG/KG	2.1	1.0
-008	BOWMD8	% Solids	95.9		%	0.01	1.0
		Chloride by IC	2.4		MG/KG	1.3	1.0
		Fluoride by IC	2.6	u	MG/KG	2.6	1.0
		Nitrite by IC	1.3	u	MG/KG	1.3	1.0
		Nitrate by IC	1.6		MG/KG	1.3	1.0
		Cyanide, Total	0.52	u	MG/KG	0.52	1.0
		Phosphate by IC	1.3	u	MG/KG	1.3	1.0
		Chromium VI	0.42	u	MG/KG	0.42	1.0
		Sulfate by IC	2.8		MG/KG	1.3	1.0
		Nitrate Nitrite	0.31		MG/KG	0.21	1.0
		Ammonia, as N	1.3	u	MG/KG	1.3	1.0
		pH	8.6		SOIL PH	0.01	1.0
		Sulfide	3.9		MG/KG	2.1	1.0

2/11/00

~~008~~

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-078 **W.O. # :** 10985-001-001-9999-00
RFW# : 9910L501 **Date Received:** 10-23-99
SDG# : H0590
SAF# : B99-078

INORGANIC CASE NARRATIVE

1. This narrative covers the analyses of 8 soil samples.

2. The samples were prepared and analyzed in accordance with the methods indicated on the attached glossary.

3. Sample holding times as required by the method and/or contract were met.

4. The cooler temperatures were recorded on the chain-of-custody.

5. The method blanks were within method criteria.

6. The Laboratory Control Samples (LCS) were within the laboratory control limits. The duplicate LCS were within the 20% Relative Percent Difference (RPD) control limit.

7. The matrix spike recoveries were within the 75-125% control limits.

8. The replicate analyses were within the 20% RPD control limit.

9. Results for solid samples are reported on a dry weight basis.

Pat Ec
J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

12-6-99
Date

njp\i10-501

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-144	Page 1 of 1

Collector Bowers/Trice	Company Contact Chris Cearlock	Telephone No. 372-9574	Project Coordinator TRENT, SJ
Project Designation 200 Area Source characterization - 200-CW-1 OU	Sampling Location 200 B pond		SAF No. B99-078
Ice Chest No. ERC 99 012 / ERC99 023	Field Logbook No. EL-1511		Method of Shipment FED EX
Shipped To ~~TMA/RECRA~~ OJB 10-21-99	Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A
			COA B20CW1671C

Price Code 8N

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
Type of Container	aG	aG	aG	aG	aG	aG	aG			
No. of Container(s)	1	1	1	1	1	1	1			
Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL			
SAMPLE ANALYSIS	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			

Sample No.	Matrix *	Sample Date	Sample Time	Isotopic Uranium	VOA	pH	Item (1)	Semi-VOA	Item (2)	Item (3)			
BOWMD1	Soil	10-21-99	1012		X	X	X	X	X		B0W9T9		
BOWMD2	Soil	10-21-99	1017		X	X	X	X	X		B0W9T9		
BOWMD3	Soil	10-21-99	1047		X	X	X	X	X		B0W9W0		
BOWMD4	Soil	10-21-99	1102		X	X	X	X	X		B0W9W0		Recd
~~BOWMD5~~	~~Soil~~	~~10-21-99~~	~~1118~~	RF	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~		~~B0W9T9~~		Recd samples

CHAIN OF POSSESSION — Sign/Print Names — 10-22-99

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers / Doug Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Ref 3C	10-22-99 0800	R Fehlberg / R Fehlberg	10-22-99 0800
R Fehlberg / R Fehlberg	10-22-99 1330	Fed Ex	
Fed Ex	10/23/99 1000	[illegible signature]	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; ICP Metals - 6010A (Supertrace Add-On) {Beryllium, Copper, Nickel, Vanadium, Zinc}; Mercury - 7471 - (CV); Chromium Hex - 7196

(2) NO2/NO3 - 353.1; IC Anions - 300.0 {Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010

(3) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241}; Strontium-89,90 -- Total Sr; Total Uranium {Uranium}; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Americium-241

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

000016

020

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-145	Page 1 of 1

021

Collector: Bowers/Trice	Company Contact: Chris Cearlock — Telephone No.: 372-9574	Project Coordinator: TRENT, SJ	Price Code: 8N — Data Turnaround: 45 Days
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond	SAF No.: B99-078	
Ice Chest No.: ERC 96-025	Field Logbook No.: EL-1511	Method of Shipment: FED EX	
Shipped To: TMA/RECRA D70 10-21-99	Offsite Property No.: A00 0005	Bill of Lading/Air Bill No.: 42357953 0966	
		COA: B20CW167IC	

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	None	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	aG	aG	aG	aG	aG	aG	aG	aG	aG	aG
Special Handling and/or Storage	No. of Container(s)	1	1	1	1	1	1	1	1	1	1
	Volume	60mL	60mL	60mL	120mL	250mL	250mL	500mL	500mL	1000mL	1000mL
SAMPLE ANALYSIS		Isotopic Uranium	Nickel-63	Technetium-99	Tritium - H3	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time										
Bowm D6	Soil	10-21-99	1130					X	X	X	X	X	
Bowm D7	Soil	10-21-99	1140					X	X	X	X	X	
Bowm D8	Soil	10-21-99	1150					X	X	X	X	X	

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By	Doug Bowers	10-21-99/1400
Received By	R of 3C	10-21-99/1400
Relinquished By	R of 3C	10-22-99/0800
Received By	R. Thoren/Rikki Thoren	10-22-99/0800
Relinquished By	Rikki Thoren	10-22-99/1430
Received By	FED EX	
Relinquished By	Fed Ex	10-23-99/1000
Received By	[signature]	10-23-99/1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; ICP Metals - 6010A (Supertrace Add-On) {Beryllium, Copper, Nickel, Vanadium, Zinc}; Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 {Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241}; Strontium-89,90 -- Total Sr; Total Uranium {Uranium}; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Americium-241

use Bow BCI as TA. for ship

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
			9910L501

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-144	Page 1 of 1

Collector	Company Contact / Telephone No.	Project Coordinator	Price Code	Data Turnaround
Bowers/Trice	Chris Cearlock 372-9574	TRENT, SJ	8N	45 Days
Project Designation	**Sampling Location**	**SAF No.**		
200 Area Source characterization - 200-CW-1 OU	200 B pond	B99-078		
Ice Chest No.	**Field Logbook No.**	**Method of Shipment**		
ERC 96-025	EL-1511	FED EX		
Shipped To	**Offsite Property No.**	**Bill of Lading/Air Bill No.**		
TMA/REDRA 10-21-99	A0000005	42357953 09466		
		COA B20CW1 671C		

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
	Type of Container	aG	aG	aG	aG	aG	aG	aG			
	No. of Container(s)	1	1	1	1	1	1	1			
Special Handling and/or Storage	Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL			
SAMPLE ANALYSIS		Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			

Sample No.	Matrix *	Sample Date	Sample Time								
BOWMD1	Soil	10-21-99	1012	X					X	BOWMT9	
BOWMD2	Soil	10-21-99	1017	X					X	BOWMT9	
BOWMD3 DUP	Soil	10-21-99	1047	X					X	BOWMW0	
BOWMD4	Soil	10-21-99	1102	X				BK	X	BOWMW0	
BOWMD5	Soil	10-21-99	1118	X					X	BOWMD9	

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By	Doug Bowers	10-21-99/1400
Received By	Ref 3C	10-21-99/1400
Relinquished By	Ref 3C	10.22.99/0800
Received By	RIKKI THOREN	10.22.99/0800
Relinquished By	RIKKI THOREN	10.22.99/1430
Received By	FED EX	
Relinquished By	Fed Ex	10.23.99 1000
Received By	Sandy Cox	10.23.99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 300-CW-1			DATA PACKAGE: H0590		
VALIDATOR: TLC		LAB: RecRT		DATE: 2/1/00	
CASE:			SDG: H0590		

ANALYSES PERFORMED

☒ Anions/IC	☐ TOC	☐ TOX	☐ TPH-418.1	Oil and Grease	Alkalinity
☒ Ammonia	☐ BOD/COD	☐ Chloride	☐ Chromium-VI	☒ pH	☒ NO_3/NO_2
☐ Sulfate	☐ TDS	☐ TKN	☐ Phosphate	☒ RCRA	☒ Sulfide
☐	☐	☐	☐	☒ Cyanide	☐

SAMPLES/MATRIX B0WMD1 B0WMD2 B0WMD3
B0WMD4 B0WMD8 B0WMD5
B0WMD6 B0WMD7

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

Was initial calibration performed for all applicable analyses?	Yes	No	N/A
Are initial calibration results acceptable?	Yes	No	N/A
Was a calibration check performed for all applicable analyses?	Yes	No	N/A
Are calibration check results acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were laboratory blanks analyzed?	Yes	No	N/A
Are laboratory blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments:

5. ACCURACY

Were spike samples analyzed at the required frequency?	Yes	No	N/A
Are spike recoveries acceptable?	Yes	No	N/A
Were LCS analyses performed at the required frequency?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments: 002/003 ok

6. PRECISION

Were laboratory duplicate samples analyzed at the required frequency?	Yes	No	N/A
Are laboratory duplicate sample RPD values acceptable?	Yes	No	N/A
Are field duplicate RPD values acceptable?	Yes	No	N/A
Are field split RPD values acceptable?	Yes	No	N/A

GENERAL CHEMISTRY DATA VALIDATION CHECKLIST

Comments:

7. ANALYTE QUANTITATION

Was analyte quantitation performed properly? . . . . . Yes No (N/A)

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . (Yes) No N/A

Are results supported in the raw data? . . . . . Yes No (N/A)

Are results calculated properly? . . . . . Yes No (N/A)

Do results meet the CRDLs? . . . . . Yes (No) N/A

Comments: Fluoride - all

nitrite - all

ammonia - D2, D3, D5, D6, D7, D8

Date: 15 February 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 200 Area Source Characterization - 200-CW-1 Operable Unit
Subject: Inorganics - Data Package No. H0590-RLN (SDG No. H0590)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0590-RLN prepared by Recra LabNet (RLN). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B0WMD1	10/21/99	Soil	C	See note 1
B0WMD2	10/21/99	Soil	C	See note 1
B0WMD3	10/21/99	Soil	C	See note 1
B0WMD4	10/21/99	Soil	C	See note 1
B0WMD5	10/21/99	Soil	C	See note 1
B0WMD6	10/21/99	Soil	C	See note 1
B0WMD7	10/21/99	Soil	C	See note 1
B0WMD8	10/21/99	Soil	C	See note 1

1- ICP metals by 6010B; mercury by 7471A.

Data validation was conducted in accordance with the BHI validation statement of work and the *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*, DOE/RL-99-07, Draft B. Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times for mercury and ICP metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within six (6)

months for ICP metals and 28 days for mercury.

All holding times were acceptable.

- **Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations (in ug/L) less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 25% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

Due to a matrix spike recovery of 34%, all silver results were qualified as

estimates and flagged "J".

Due to a matrix spike recovery of -120%, all detected mercury results were qualified as estimates and flagged "J" and all undetected mercury results were rejected and flagged "R".

Due to a matrix spike recovery of 4.7%, all lead results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 38.5%, all antimony results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 34%, all zinc results were qualified as estimates and flagged "J".

All other matrix spike recovery results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ".

Due to an RPD of 43.4%, all lead results were qualified as estimates and flagged "J".

Due to an RPD of 35%, all silver results were qualified as estimates and flagged "J".

Due to an RPD of 30.2%, all barium results were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples (samples B0WMD1/B0WMD2) were submitted to RLN for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. The RPDs for barium (31%), cadmium (57%) and mercury (59%)

were outside QC limits. Under the BHI statement of work, no qualification is required. All other field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the PQLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific PQL.

- **Completeness**

Data package No. H0590 was submitted for validation and verified for completeness. The completion percentage was 97.5%.

MAJOR DEFICIENCIES

Due to a matrix spike recovery of -120%, all undetected mercury results were rejected and flagged ""R". Rejected data is unusable and should not be reported.

MINOR DEFICIENCIES

Due to an RPD of 43.4%, all lead results were qualified as estimates and flagged "J". Due to an RPD of 35%, all silver results were qualified as estimates and flagged "J". Due to an RPD of 30.2%, all barium results were qualified as estimates and flagged "J". Due to a matrix spike recovery of 34%, all silver results were qualified as estimates and flagged "J". Due to a matrix spike recovery of -120%, all detected mercury results were qualified as estimates and flagged "J". Due to a matrix spike recovery of 4.7%, all lead results were qualified as estimates and flagged "J". Due to a matrix spike recovery of 38.5%, all antimony results were qualified as estimates and flagged "J". Due to a matrix spike recovery of 34%, all zinc results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-07, Draft B, *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0590	REVIEWER: TLI	DATE: 2/15/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Silver, lead, antimony, zinc	J	All	MS percent recovery
Lead, silver, barium	J	All	RPD
Mercury	J	B0WMD1, B0WMD2, B0WMD3, B0WMD4, B0WMD5	MS percent recovery
Mercury	R	B0WMD6, B0WMD7, B0WMD8	MS percent recovery

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: BECHTEL-HANFORD																			
Laboratory: Recra LabNet																			
Case	SDG: H0590																		
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8			
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond			
Remarks				Duplicate															
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99			
Inorganics	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Silver	2	8.4	J	7.6	J	0.13	J	0.27	J	0.18	J	0.08	UJ	0.07	UJ	0.08	UJ		
Arsenic	1	3.2		3.0		5.5		4.7		2.7		3.0		2.2		2.8			
Barium	1	108	J	79.0	J	87.6	J	84.2	J	61.5	J	101	J	130	J	70.3	J		
Beryllium	0.2	0.31		0.30		0.32		0.31		0.26		0.40		0.24		0.28			
Cadmium	0.04	0.47		0.26		0.04	U	0.04	U	0.04	U	0.04	U	0.03	U	0.04	U		
Chromium	1	11.9		13.7		12.1		10.6		6.6		6.3		5.5		7.5			
Copper	2	18.5		16.2		13.9		16.7		12.8		15.2		10.6		10.4			
Mercury	0.05	0.98	J	0.53	J	0.08	J	0.27	J	0.04	J	0.02	UR	0.02	UR	0.02	UR		
Nickel	4	9.3		11.3		44.8		9.7		6.9		8.7		8.2		8.2			
Lead	20	139	J	163	J	14.4	J	22.2	J	14.9	J	3.7	J	3.0	J	3.4	J		
Antimony		0.72	J	0.22	UJ	0.20	UJ	0.30	J	0.19	UJ	0.22	UJ	0.17	UJ	0.21	UJ		
Selenium	20	0.43	U	0.44	U	0.39	U	0.44	U	0.37	U	0.43	U	0.34	U	0.41	U		
Thallium		0.45	U	0.74		0.68		0.59		0.39	U	0.71		0.53		0.75			
Vanadium	3	52.0		55.9		67.4		58.7		54.5		89.5		58.2		67.3			
Zinc	2	127	J	123	J	57.2	J	71.2	J	47.7	J	54.7	J	39.0	J	44.5	J		

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 11/18/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	BOWMD1	Silver, Total	8.4 J	MG/KG	0.08	1.0
		Arsenic, Total	3.2	MG/KG	0.28	1.0
		Barium, Total	108 J	MG/KG	0.02	1.0
		Beryllium, Total	0.31	MG/KG	0.03	1.0
		Cadmium, Total	0.47	MG/KG	0.04	1.0
		Chromium, Total	11.9	MG/KG	0.07	1.0
		Copper, Total	18.5	MG/KG	0.05	1.0
		Mercury, Total	0.98 J	MG/KG	0.02	1.0
		Nickel, Total	9.3	MG/KG	0.11	1.0
		Lead, Total	139 J	MG/KG	0.22	1.0
		Antimony, Total	0.72 J	MG/KG	0.22	1.0
		Selenium, Total	0.43 u	MG/KG	0.43	1.0
		Thallium, Total	0.45 u	MG/KG	0.45	1.0
		Vanadium, Total	52.0	MG/KG	0.06	1.0
		Zinc, Total	127 J	MG/KG	0.05	1.0
-002	BOWMD2	Silver, Total	7.6 J	MG/KG	0.09	1.0
		Arsenic, Total	3.0	MG/KG	0.29	1.0
		Barium, Total	79.0 J	MG/KG	0.02	1.0
		Beryllium, Total	0.30	MG/KG	0.03	1.0
		Cadmium, Total	0.26	MG/KG	0.04	1.0
		Chromium, Total	13.7	MG/KG	0.07	1.0
		Copper, Total	16.2	MG/KG	0.05	1.0
		Mercury, Total	0.53 J	MG/KG	0.02	1.0
		Nickel, Total	11.3	MG/KG	0.11	1.0
		Lead, Total	163 J	MG/KG	0.22	1.0
		Antimony, Total	0.22 u J	MG/KG	0.22	1.0
		Selenium, Total	0.44 u	MG/KG	0.44	1.0
		Thallium, Total	0.74	MG/KG	0.46	1.0
		Vanadium, Total	55.9	MG/KG	0.06	1.0
		Zinc, Total	123 J	MG/KG	0.05	1.0

2/11/00

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 11/18/99

CLIENT: TNU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	BOWMD3	Silver, Total	0.13	J	MG/KG	0.08	1.0
		Arsenic, Total	5.5		MG/KG	0.26	1.0
		Barium, Total	87.6	J	MG/KG	0.02	1.0
		Beryllium, Total	0.32		MG/KG	0.03	1.0
		Cadmium, Total	0.04	u	MG/KG	0.04	1.0
		Chromium, Total	12.1		MG/KG	0.07	1.0
		Copper, Total	13.9		MG/KG	0.05	1.0
		Mercury, Total	0.08	J	MG/KG	0.01	1.0
		Nickel, Total	44.8		MG/KG	0.1	1.0
		Lead, Total	14.4	J	MG/KG	0.20	1.0
		Antimony, Total	0.20	u J	MG/KG	0.20	1.0
		Selenium, Total	0.39	u	MG/KG	0.39	1.0
		Thallium, Total	0.68		MG/KG	0.41	1.0
		Vanadium, Total	67.4		MG/KG	0.06	1.0
		Zinc, Total	57.2	J	MG/KG	0.05	1.0
-004	BOWMD4	Silver, Total	0.27	J	MG/KG	0.09	1.0
		Arsenic, Total	4.7		MG/KG	0.29	1.0
		Barium, Total	84.2	J	MG/KG	0.02	1.0
		Beryllium, Total	0.31		MG/KG	0.03	1.0
		Cadmium, Total	0.04	u	MG/KG	0.04	1.0
		Chromium, Total	10.6		MG/KG	0.08	1.0
		Copper, Total	16.7		MG/KG	0.05	1.0
		Mercury, Total	0.27	J	MG/KG	0.02	1.0
		Nickel, Total	9.7		MG/KG	0.11	1.0
		Lead, Total	22.2	J	MG/KG	0.23	1.0
		Antimony, Total	0.30	J	MG/KG	0.23	1.0
		Selenium, Total	0.44	u	MG/KG	0.44	1.0
		Thallium, Total	0.59		MG/KG	0.47	1.0
		Vanadium, Total	58.7		MG/KG	0.07	1.0
		Zinc, Total	71.2	J	MG/KG	0.05	1.0

2/11/00

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 11/18/99

CLIENT: TWU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT	DILUTION FACTOR
-005	BOWND5	Silver, Total	0.18	J	MG/KG	0.07	1.0
		Arsenic, Total	2.7		MG/KG	0.25	1.0
		Barium, Total	61.5	J	MG/KG	0.02	1.0
		Beryllium, Total	0.26		MG/KG	0.03	1.0
		Cadmium, Total	0.04	u	MG/KG	0.04	1.0
		Chromium, Total	6.6		MG/KG	0.06	1.0
		Copper, Total	12.8		MG/KG	0.05	1.0
		Mercury, Total	0.04	J	MG/KG	0.02	1.0
		Nickel, Total	6.9		MG/KG	0.09	1.0
		Lead, Total	14.9	J	MG/KG	0.19	1.0
		Antimony, Total	0.19	uJ	MG/KG	0.19	1.0
		Selenium, Total	0.37	u	MG/KG	0.37	1.0
		Thallium, Total	0.39	u	MG/KG	0.39	1.0
		Vanadium, Total	54.5		MG/KG	0.05	1.0
		Zinc, Total	47.7	J	MG/KG	0.05	1.0
-006	BOWND6	Silver, Total	0.08	uJ	MG/KG	0.08	1.0
		Arsenic, Total	3.8		MG/KG	0.29	1.0
		Barium, Total	101	J	MG/KG	0.02	1.0
		Beryllium, Total	0.40		MG/KG	0.03	1.0
		Cadmium, Total	0.04	u	MG/KG	0.04	1.0
		Chromium, Total	6.3		MG/KG	0.07	1.0
		Copper, Total	15.2		MG/KG	0.05	1.0
		Mercury, Total	0.02	uR	MG/KG	0.02	1.0
		Nickel, Total	8.7		MG/KG	0.11	1.0
		Lead, Total	3.7	J	MG/KG	0.22	1.0
		Antimony, Total	0.22	uJ	MG/KG	0.22	1.0
		Selenium, Total	0.43	uR	MG/KG	0.43	1.0
		Thallium, Total	0.71		MG/KG	0.45	1.0
		Vanadium, Total	89.5		MG/KG	0.06	1.0
		Zinc, Total	54.7	J	MG/KG	0.05	1.0

11/11/00

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 11/18/99

CLIENT: TWD-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-007	BOWMD7	Silver, Total	0.07 u J	MG/KG	0.07	1.0
		Arsenic, Total	2.2	MG/KG	0.22	1.0
		Barium, Total	136 J	MG/KG	0.02	1.0
		Beryllium, Total	0.24	MG/KG	0.02	1.0
		Cadmium, Total	0.03 u	MG/KG	0.03	1.0
		Chromium, Total	5.5	MG/KG	0.06	1.0
		Copper, Total	10.6	MG/KG	0.04	1.0
		Mercury, Total	0.02 u R	MG/KG	0.02	1.0
		Nickel, Total	8.2	MG/KG	0.08	1.0
		Lead, Total	3.0 J	MG/KG	0.17	1.0
		Antimony, Total	0.17 u J	MG/KG	0.17	1.0
		Selenium, Total	0.34 u	MG/KG	0.34	1.0
		Thallium, Total	0.53	MG/KG	0.35	1.0
		Vanadium, Total	58.2	MG/KG	0.05	1.0
		Zinc, Total	39.0 J	MG/KG	0.04	1.0
-008	BOWMD8	Silver, Total	0.08 u J	MG/KG	0.08	1.0
		Arsenic, Total	2.8	MG/KG	0.27	1.0
		Barium, Total	70.3 J	MG/KG	0.02	1.0
		Beryllium, Total	0.28	MG/KG	0.03	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	7.5	MG/KG	0.07	1.0
		Copper, Total	10.4	MG/KG	0.05	1.0
		Mercury, Total	0.02 u R	MG/KG	0.02	1.0
		Nickel, Total	8.2	MG/KG	0.10	1.0
		Lead, Total	3.4 J	MG/KG	0.21	1.0
		Antimony, Total	0.21 u J	MG/KG	0.21	1.0
		Selenium, Total	0.41 u	MG/KG	0.41	1.0
		Thallium, Total	0.75	MG/KG	0.44	1.0
		Vanadium, Total	67.3	MG/KG	0.06	1.0
		Zinc, Total	44.5 J	MG/KG	0.05	1.0

2/11/00

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA
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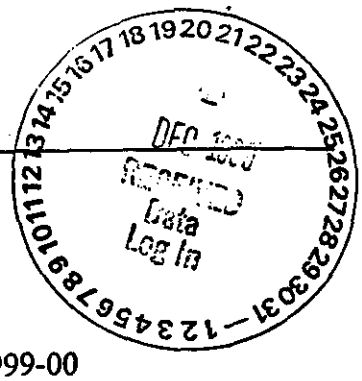
INC.

Chemical and Environmental Measurement Information



Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-078
RFW# : 9910L501
SDG/SAF# : H0590/B99-078

W.O.# : 10985-001-001-9999-00
Date Received: 10-23-99

METALS CASE NARRATIVE

1. This narrative covers the analyses of 8 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

3. All analyses were performed within the required holding times.

4. All cooler temperatures have been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury) with the exception of the CCV following the last three samples for Cadmium (112.6%), Nickel (110.9%) and Lead (110.8%). All Cadmium results are non-detect so there is no significant bias to the results. The Nickel and Lead recoveries are just slightly outside the control limits so there should be no significant impact to the data.

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. All preparation/method blanks (MB) were within method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. The matrix spike (MS) recoveries for 5 analytes were outside the 75-125% control limits. Refer to the Inorganics Accuracy Report.

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AE

11. For analytes where the ICP MS is out-of-control, a post-digestion MS (PDS) and serial dilution are performed. A serial dilution is performed for Mercury. A PDS was prepared at meaningful concentration levels, due to high concentrations of the following analytes:

Sample ID	Element	PDS Concentration (ppb)	PDS % Recovery
BOWMD1	Antimony	500	104.4
	Lead	500	112.3
	Silver	500	102.2
	Zinc	500	106.2

12. The duplicate analyses for 7 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

13. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

Pat Ec

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

11-22-99
Date

mld/m10-501

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | B99-078-144 | Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock — Telephone No. 372-9574	Project Coordinator: TRENT, SJ	Price Code 8N — Data Turnaround 45 Days
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond	SAF No. B99-078	
Ice Chest No. ERC 99 012 / ERC 99 023	Field Logbook No. EL-1511	Method of Shipment: FED EX	
Shipped To: TMA/RECRA 10-21-99	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A	
		COA B20CW1 671C	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None		
Type of Container	aG	aG	aG	aG	aG	aG	aG		
No. of Container(s)	1	1	1	1	1	1	1		
Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL		
SAMPLE ANALYSIS	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.		

	Sample No.	Matrix *	Sample Date	Sample Time	Isotopic Uranium	VOA	pH	Item (1)	Semi-VOA	Item (2)	Item (3)		
6k	BOWMD1	Soil	10-21-99	1012		X	X	X	X	X		BOW9T9	
3k	BOWMD2	Soil	10-21-99	1017		X	X	X	X	X		BOW9T9	
4k	BOWMD3	Soil	10-21-99	1047		X	X	X	X	X		BOW9W0	
7k	BOWMD4	Soil	10-21-99	1102		X	X	X	X	X		BOW9W0	Red samples
800	BOWMD5	Soil	10-21-99	1118	RF 10-22-99	X	X	X	X	X		BOW9T9	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers / Doug Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Ref 3C	10-22-99 0800	[signature]	10-22-99 0800
[signature]	10-22-99 1330	Fed Ex	
Fed Ex	10/23/99 1000	[signature]	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; ICP Metals - 6010A (Supertrace Add-On) {Beryllium, Copper, Nickel, Vanadium, Zinc}; Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 {Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241}; Strontium-89,90 – Total Sr; Total Uranium {Uranium}; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Americium-241

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

000018

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | **B99-078-145** | Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock	Telephone No.: 372-9574	Project Coordinator: TRENT, SJ
Price Code: 8N	Data Turnaround: 45 Days		
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond		SAF No.: B99-078
Ice Chest No.: ERC 96-025	Field Logbook No.: EL-1511		Method of Shipment: FED EX
Shipped To: TMA/RECRA B70 10-21-29	Offsite Property No.: A00 0005		Bill of Lading/Air Bill No.: 42357953 0966
			COA: B20CW1 671C

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	None	None	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None
Type of Container	sG	sG	sG	sG	sG	sG	sG	sG	sG	sG
No. of Container(s)	1	1	1	1	1	1	1	1	1	1
Volume	60mL	60mL	60mL	120mL	250mL	250mL	500mL	500mL	1000mL	1000mL

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	Isotopic Uranium	Nickel-63	Technetium-99	Tritium - HD	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (1) in Special Instructions.
Bowm D6	Soil	10-21-99	1130					X	X	X	X	X	
Bowm D7	Soil	10-21-99	1140					X	X	X	X	X	
Bowm D8	Soil	10-21-99	1150					X	X	X	X	X	

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers / Doug Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Relinquished By: Ref 3C	10-22-99/0800	Received By: R. Thoren / Rikki Thoren	10-22-99/0800
Relinquished By: Rikki Thoren / R. Thoren	10-22-99/1430	Received By: FED EX	Date/Time
Relinquished By: Fed Ex	10-23-99 1000	Received By: Linda Hennig	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

use Bowers TA to ship

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Date/Time
	9910L501	
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By / Date/Time

0000019

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-078-144 Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock	Telephone No.: 372-9574	Project Coordinator: TRENT, SJ
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond		SAF No.: B99-078
Ice Chest No.: ERC 96.025	Field Logbook No.: EL-1511		Method of Shipment: FED EX
Shipped To: TMA/RE/RA 10-21-99	Offsite Property No.: A000095		Bill of Lading/Air Bill No.: 42357953 09466
			COA B20CW1 671C

Price Code: 8N — Data Turnaround: 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

000020

SAMPLE ANALYSIS	Preservation	Type of Container	No. of Container(s) / Volume	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			
	None	gG	1 / 60mL										
	Cool 4C	gG	1 / 250mL										
	None	gG	1 / 250mL										
	Cool 4C	gG	1 / 500mL										
	Cool 4C	gG	1 / 500mL										
	Cool 4C	gG	1 / 1000mL										
	None	gG	1 / 1000mL										

Sample No.	Matrix *	Sample Date	Sample Time										
BOWMD1	Soil	10-21-99	1012	X						X	BOWMT9		
BOWMD2	Soil	10-21-99	1017	X						X	BOWMT9		
BOWMD3 DUP	Soil	10-21-99	1047	X						X	BOWMW0		
BOWMD4	Soil	10-21-99	1102	X					DUP	X	BOWMW0		
BOWMD5	Soil	10-21-99	1118	X						X	BOWMD9		

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By: Doug Bowers	Doug Bowers	10-21-99/1400
Received By: Ref 3C		10-21-99/1400
Relinquished By: Ref 3C		10.22.99/0800
Received By: RIKKI THOREN	R. Thoren	10-22-99/0800
Relinquished By: RIKKI THOREN	R. Thoren	10.22.99/1430
Received By: FEDEX		
Relinquished By: FedEx		102399 1000
Received By:		102399 1000
LABORATORY SECTION — Received By		
FINAL SAMPLE DISPOSITION — Disposal Method	Disposed By	

Title — Date/Time

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 – Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-CW-4			DATA PACKAGE: H0590		
VALIDATOR: TCL		LAB: Rem A		DATE: 1/31/00	
CASE:			SDG: H0590		

ANALYSES PERFORMED

☒ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☒ SW-846/Hg	☐ SW-846 Cyanide	☐	☐

SAMPLES/MATRIX BOWMD1 BOWMD2 BOWMD3 BOWMD4 BOWMD5 BOWMD6 BOWMD7 BOWMD8

Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: Cover memo - Calibration problems

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?	Yes	No	**N/A**
Are initial calibrations acceptable?	Yes	No	**N/A**
Are ICP interference checks acceptable?	Yes	No	**N/A**
Were ICV and CCV checks performed on all instruments?	Yes	No	**N/A**
Are ICV and CCV checks acceptable?	Yes	No	**N/A**

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?	Yes	No	**N/A**
Are ICB and CCB results acceptable?	~~Yes~~	No	**N/A**
Were preparation blanks analyzed?	**Yes**	No	N/A
Are preparation blank results acceptable?	**Yes**	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments:

5. ACCURACY

Were spike samples analyzed?	**Yes**	No	N/A
Are spike sample recoveries acceptable?	Yes	**No**	N/A
Were laboratory control samples (LCS) analyzed?	Yes	No	**N/A**
Are LCS recoveries acceptable?	Yes	No	**N/A**

Comments: Silver 34% Hg -120 lead 4.7 Antimony 385 K..
Zinc 34 R undetected Hg

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	(Yes)	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	(No)	N/A
Were ICP serial dilution samples analyzed?	Yes	No	(N/A)
Are ICP serial dilution %D values acceptable?	Yes	No	(N/A)
Are field duplicate RPD values acceptable?	Yes	(No)	N/A
Are field split RPD values acceptable?	Yes	No	(N/A)

Comments: Lead 43.4 FD Bar 317% cad 57 Hg 57
Silver 359%
Barium 30.2
~~Cadmium 59.7~~ W.N 2x RDL

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	N/A
Are duplicate injection %RSD values acceptable?	Yes	No	N/A
Were analytical spikes performed as required?	Yes	No	N/A
Are analytical spike recoveries acceptable?	Yes	No	N/A
Was MSA performed as required?	Yes	No	N/A
Are MSA results acceptable?	Yes	No	N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	(Yes)	No	N/A
Are all results supported in the raw data?	Yes	No	(N/A)
Are results calculated properly?	Yes	No	~~N/A~~
Do results meet the CRDLs?	(Yes)	No	N/A

Comments:

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 11/18/99

CLIENT: TWU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	BOWMD1	Silver, Total	8.4	5.9	35.0	1.0
		Arsenic, Total	3.2	2.5	24.6	1.0
		Barium, Total	108	79.4	30.2	1.0
		Beryllium, Total	0.31	0.30	2.7	1.0
		Cadmium, Total	0.47	0.26	59.7	1.0
		Chromium, Total	11.9	13.4	11.9	1.0
		Copper, Total	18.5	15.5	17.6	1.0
		Mercury, Total	0.98	1.0	4.6	1.0
		Nickel, Total	9.3	10.5	12.1	1.0
		Lead, Total	139	89.3	43.4	1.0
		Antimony, Total	0.72	0.22u	~~NC~~ 200	1.0
		Selenium, Total	0.43u	0.43u	NC	1.0
		Thallium, Total	0.45u	0.45u	NC	1.0
		Vanadium, Total	52.0	55.6	6.7	1.0
		Zinc, Total	127	98.6	25.4	1.0

Corrections JD 11/15/99

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Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 11/18/99

CLIENT: TWU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	BOWMD1	Silver, Total	10.2	8.4	5.3	34.0	1.0
		Arsenic, Total	200	3.2	211	93.7	1.0
		Barium, Total	280	108	211	81.8	1.0
		Beryllium, Total	4.9	0.31	5.3	86.6	1.0
		Cadmium, Total	5.1	0.47	5.3	87.3	1.0
		Chromium, Total	32.0	11.9	21.1	95.3	1.0
		Copper, Total	41.2	18.5	26.3	86.3	1.0
		Mercury, Total	0.76	0.98	0.18	-120. *	1.0
		Nickel, Total	59.8	9.3	52.7	95.8	1.0
		Lead, Total	141	139	52.7	4.7	1.0
		Antimony, Total	21.0	0.72	52.7	38.5	1.0
		Selenium, Total	194	0.43u	211	92.3	1.0
		Thallium, Total	189	0.45u	211	89.9	1.0
		Vanadium, Total	109	52.0	52.7	108.5	1.0
		Zinc, Total	145	127	52.7	34.0	1.0

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Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 11/18/99

CLIENT: TWC-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	BOWMD1	Silver, Total	10.2	8.4	5.3	34.0	1.0
		Arsenic, Total	200	3.2	211	93.7	1.0
		Barium, Total	286	108	211	81.8	1.0
		Beryllium, Total	4.9	0.31	5.3	86.6	1.0
		Cadmium, Total	5.1	0.47	5.3	87.3	1.0
		Chromium, Total	32.0	11.9	21.1	95.3	1.0
		Copper, Total	41.2	18.5	26.3	86.3	1.0
		Mercury, Total	0.76	0.98	0.18	-120. *	1.0
		Nickel, Total	59.8	9.3	52.7	95.8	1.0
		Lead, Total	141	139	52.7	4.7	1.0
		Antimony, Total	21.0	0.72	52.7	38.5	1.0
		Selenium, Total	194	0.43u	211	92.3	1.0
		Thallium, Total	189	0.45u	211	89.9	1.0
		Vanadium, Total	109	52.0	52.7	108.5	1.0
		Zinc, Total	145	127	52.7	34.0	1.0

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Recra LabNet - Lionville

INORGANICS PRECISION REPORT 11/18/99

CLIENT: TWU-HANFORD B99-078 RECRA LOT #: 9910L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	BOWMD1	Silver, Total	8.4	5.9	35.0	1.0
		Arsenic, Total	3.2	2.5	24.6	1.0
		Barium, Total	108	79.4	30.2	1.0
		Beryllium, Total	0.31	0.30	2.7	1.0
		Cadmium, Total	0.47	0.26	59.7	1.0
		Chromium, Total	11.9	13.4	11.9	1.0
		Copper, Total	18.8	15.5	17.6	1.0
		Mercury, Total	0.98	1.0	4.6	1.0
		Nickel, Total	9.3	10.5	12.1	1.0
		Lead, Total	139	89.3	43.4	1.0
		Antimony, Total	0.72	0.22u	NC — 200	1.0
		Selenium, Total	0.43u	0.43u	NC	1.0
		Thallium, Total	0.48u	0.48u	NC	1.0
		Vanadium, Total	52.0	55.6	6.7	1.0
		Zinc, Total	127	98.6	25.4	1.0

Corrections JD 11/15/99

Date: 15 February 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 200 Area Source Characterization - 200-CW-1 Operable Unit
Subject: Volatiles - Data Package No. H0590-RLN (SDG No. H0590)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0590-RLN prepared by Recra LabNet (RLN). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B0WMD1	10/21/99	Soil	C	See note 1 & 2
B0WMD2	10/21/99	Soil	C	See note 1 & 2
B0WMD3	10/21/99	Soil	C	See note 1 & 2
B0WMD4	10/21/99	Soil	C	See note 1 & 2
B0WMD5	10/21/99	Soil	C	See note 1 & 2
B0WMD6	10/21/99	Soil	C	See note 1 & 2
B0WMD7	10/21/99	Soil	C	See note 1 & 2
B0WMD8	10/21/99	Soil	C	See note 1 & 2

1 - Volatiles by EPA 8260A
2 - Alcohols (butanol and ethanol) by 8015B and diesel range organics by 8015B

Data validation was conducted in accordance with the BHI validation statement of work and the *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*, DOE/RL-99-07, Draft B. Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times are assessed to ascertain whether the holding time requirements were met by the laboratory. Preserved soil samples must be analyzed within 14 days of the date of sample collection for VOA, diesel and alcohols. If holding times are exceeded, but not by greater than twice the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than twice the limit, all associated detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

  All holding times were met.

- **Blanks**

  Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples of a given matrix. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for laboratory contaminants) the highest associated blank result, the sample result value is raised to the CRQL, qualified as undetected and flagged "U".

  Due to laboratory blank contamination, the methylene chloride result in all samples were qualified as undetected and flagged "U".

  All other method blank results were acceptable.

- **Accuracy**

  Matrix Spike/Matrix Spike Duplicate Recoveries

  Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using the target compounds for which

percent recoveries must be within control limits of 70-130%. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All matrix spike/matrix spike duplicate recovery results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provides a measure of system performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory program. When a surrogate compound recovery is out of the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Undetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Samples with surrogate recoveries less than ten percent are qualified as estimates and flagged "J" for detects, and rejected and flagged "UR" for nondetects. Undetected compounds with surrogate recoveries greater than the upper control limit require no qualification. Surrogates are not required for formaldehyde analysis.

Due to the lack of a surrogate analysis, all n-propyl alcohol and ethanol results were qualified as estimates and flagged "J".

Due to the surrogate being diluted out of the sample, the diesel range organic result in sample B0WMD4 was rejected and flagged "R" and the motor oil result was qualified as an estimate and flagged "J".

All other surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. For samples analyzed using SW-846 protocol, results must be within RPD limits of +/- 30% for solid samples. If RPD values are out of specification and the sample concentration is less than five times the spike

concentration, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All precision results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples (samples B0WMD1/B0WMD2) were submitted to RLN for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. The RPD for motor oil (50%) was outside QC limits. Under the BHI statement of work, no qualification is required. All other field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the PQL to ensure that laboratory detection levels meet the required criteria. The following were reported above the PQL: Chloromethane, bromomethane, vinyl chloride, chloroethane, acetone, 2-butanone, 4-methyl-2-pentanone and 2-hexanone in samples B0WMD2, B0WMD3, B0WMD5, B0WMD6 and B0WMD7; and all analytes(with a PQL) in samples B0WMD1, B0WMD4 and B0WMD8. Under the BHI statement of work, no qualification is required. All other analytes met the analyte specific CRDL.

- **Completeness**

Data package No. H0590-RLN (SDG No. H0590) was submitted for validation and verified for completeness. The completion percentage was 99.6%.

MAJOR DEFICIENCIES

Due to the surrogate being diluted out of the sample, the diesel range organic result in sample B0WMD4 was rejected and flagged "R". Rejected data is unusable and should not be reported.

MINOR DEFICIENCIES

Due to the lack of a surrogate analysis, all n-propyl alcohol and ethanol results were qualified as estimates and flagged "J". Due to the surrogate being diluted

out of the sample, the motor oil result was qualified as an estimate and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

Due to laboratory blank contamination, the methylene chloride result in all samples were qualified as undetected and flagged "U".

The following were reported above the PQL: Chloromethane, bromomethane, vinyl chloride, chloroethane, acetone, 2-butanone, 4-methyl-2-pentanone and 2-hexanone in samples B0WMD2, B0WMD3, B0WMD5, B0WMD6 and B0WMD7; and all analytes(with a PQL) in samples B0WMD1, B0WMD4 and B0WMD8. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-07, Draft B, *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validator in compliance with the BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0590	REVIEWER: TLI	DATE: 2/15/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Methylene chloride	U	All	Blank contamination
Diesel range organics	R	B0WMD4	Surrogate diluted out
Motor oil	J	B0WMD4	Surrogate diluted out
n-Propyl alcohol, ethanol	J	All	No surrogate analysis

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

VOLATILE ORGANICS, SOIL MATRIX, (UG/KG)

Project: BECHTEL-HANFORD																	
Laboratory: RECRA LabNet																	
Case:	SDG: H0590																
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8	
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond	
Remarks				Duplicate													
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
Analysis Date		11/01/99		11/01/99		11/01/99		11/01/99		11/01/99		11/01/99		11/01/99		11/01/99	
VOA	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chloromethane	5	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
Bromomethane	5	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
Vinyl Chloride	5	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
Chloroethane	5	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
Methylene Chloride	5	9	U	7	U	6	U	18	U	5	U	7	U	5	U	8	U
Acetone	10	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
Carbon Disulfide		6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
1,1-Dichloroethene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
1,1-Dichloroethane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
1,2-Dichloroethene (total)	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Chloroform	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
1,2-Dichloroethane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
2-Butanone	10	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
1,1,1-Trichloroethane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Carbon Tetrachloride	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Bromodichloromethane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
1,2-Dichloropropane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
cis-1,3-Dichloropropene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Trichloroethene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Dibromochloromethane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
1,1,2-Trichloroethane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Benzene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
trans-1,3-Dichloropropene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Bromoform	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
4-Methyl-2-pentanone	5	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
2-Hexanone	5	12	U	10	U	10	U	12	U	9	U	10	U	9	U	11	U
Tetrachloroethene	5	6	U	5	U	5	U	6	U	5	U	2		4	U	6	U
1,1,2,2-Tetrachloroethane	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Toluene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Chlorobenzene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Ethylbenzene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Styrene	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U
Xylenes (total)	5	6	U	5	U	5	U	6	U	5	U	5	U	4	U	6	U

ALCOHOL AND DIESEL ANALYSIS, SOIL MATRIX, (MG/KG)

Project: BECHTEL-HANFORD																	
Laboratory: RECRA LabNet																	
Case:	SDG: H0590																
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8	
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond	
Remarks				Duplicate													
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
Preparation Date		11/03/99		11/03/99		11/03/99		11/03/99		11/03/99		11/03/99		11/03/99		11/03/99	
Analysis Date		11/04/99		11/04/99		11/04/99		11/04/99		11/04/99		11/04/99		11/04/99		11/04/99	
Alcohols	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
n-Propyl alcohol		5.0	UJ	5.0	UJ	5.5	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ
Ethanol		5.0	UJ	5.0	UJ	5.5	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ
Preparation Date		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99		10/28/99	
Analysis Date		11/12/99		11/12/99		11/12/99		11/12/99		11/12/99		11/12/99		11/12/99		11/12/99	
Diesel Range Organics	5	6.5		4.3	U	4.4	U	45	UR	4.2	U	4.4	U	4.2	U	4.2	
Motor Oil		78		130		47	U	1100	J	39		47	U	45	U	45	U

	Cust ID:	BOWMD1	BOWMD1	BOWMD1	BOWMD2	BOWMD3	BOWMD4
Sample Information	RFW#:	001	001 MS	001 MSD	002	003	004
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.06	1.04	0.943	0.909	0.943	1.04
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate Recovery	Toluene-d8	99 %	106 %	103 %	105 %	103 %	112 %
	Bromofluorobenzene	94 %	102 %	100 %	94 %	91 %	78 %
	1,2-Dichloroethane-d4	105 %	112 %	111 %	108 %	112 %	115 %
Chloromethane		12 U	11 U	10 U	10 U	10 U	12 U
Bromomethane		12 U	11 U	10 U	10 U	10 U	12 U
Vinyl Chloride		12 U	11 U	10 U	10 U	10 U	12 U
Chloroethane		12 U	11 U	10 U	10 U	10 U	12 U
Methylene Chloride		9 ~~B~~ U	9 B	8 B	7 ~~B~~ U	6 ~~B~~ U	18 ~~B~~ U
Acetone		12 U	11 U	10 U	10 U	10 U	12 U
Carbon Disulfide		6 U	6 U	5 U	5 U	5 U	6 U
1,1-Dichloroethene		6 U	92 %	93 %	5 U	5 U	6 U
1,1-Dichloroethane		6 U	6 U	5 U	5 U	5 U	6 U
1,2-Dichloroethene (total)		6 U	6 U	5 U	5 U	5 U	6 U
Chloroform		6 U	6 U	5 U	5 U	5 U	6 U
1,2-Dichloroethane		6 U	6 U	5 U	5 U	5 U	6 U
2-Butanone		12 U	11 U	10 U	10 U	10 U	12 U
1,1,1-Trichloroethane		6 U	6 U	5 U	5 U	5 U	6 U
Carbon Tetrachloride		6 U	6 U	5 U	5 U	5 U	6 U
Bromodichloromethane		6 U	6 U	5 U	5 U	5 U	6 U
1,2-Dichloropropane		6 U	6 U	5 U	5 U	5 U	6 U
cis-1,3-Dichloropropene		6 U	6 U	5 U	5 U	5 U	6 U
Trichloroethene		6 U	100 %	98 %	5 U	5 U	6 U
Dibromochloromethane		6 U	6 U	5 U	5 U	5 U	6 U
1,1,2-Trichloroethane		6 U	6 U	5 U	5 U	5 U	6 U
Benzene		6 U	107 %	105 %	5 U	5 U	6 U
Trans-1,3-Dichloropropene		6 U	6 U	5 U	5 U	5 U	6 U
Bromoform		6 U	6 U	5 U	5 U	5 U	6 U
4-Methyl-2-pentanone		12 U	11 U	10 U	10 U	10 U	12 U
2-Hexanone		12 U	11 U	10 U	10 U	10 U	12 U
Tetrachloroethene		6 U	6 U	5 U	5 U	5 U	6 U
1,1,2,2-Tetrachloroethane		6 U	6 U	5 U	5 U	5 U	6 U
Toluene		6 U	108 %	106 %	5 U	5 U	6 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9910L501 Client: TNU-HANFORD B99-078 Work Order: 10985001001 Page: 1b

	Cust ID:	BOWMD1	BOWMD1	BOWMD1	BOWMD2	BOWMD3	BOWMD4
	RFW#:	001	001 MS	001 MSD	002	003	004
Chlorobenzene		6 U	109 %	106 %	5 U	5 U	6 U
Ethylbenzene		6 U	6 U	5 U	5 U	5 U	6 U
Styrene		6 U	6 U	5 U	5 U	5 U	6 U
Xylene (total)		6 U	6 U	5 U	5 U	5 U	6 U

*= Outside of EPA CLP QC limits.

2/11/00

	Cust ID:	BOWMD4	BOWMD5	BOWMD6	BOWMD7	BOWMD8	VBLKAI
Sample Information	RFW#:	004	005	006	007	008	99LVH505-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.02	0.893	0.926	0.862	1.04	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
		REPREP					
Surrogate Recovery	Toluene-d8	120 * %	102 %	97 %	98 %	97 %	96 %
	Bromofluorobenzene	106 %	92 %	92 %	92 %	96 %	95 %
	1,2-Dichloroethane-d4	132 * %	102 %	101 %	95 %	105 %	103 %
Chloromethane		11 U	9 U	10 U	9 U	11 U	10 U
Bromomethane		11 U	9 U	10 U	9 U	11 U	10 U
Vinyl Chloride		11 U	9 U	10 U	9 U	11 U	10 U
Chloroethane		11 U	9 U	10 U	9 U	11 U	10 U
Methylene Chloride		10 B	5 BU	7 BU	5 BU	8 BU	4 J
Acetone		11 U	9 U	10 U	9 U	11 U	10 U
Carbon Disulfide		6 U	5 U	5 U	4 U	6 U	5 U
1,1-Dichloroethene		6 U	5 U	5 U	4 U	6 U	5 U
1,1-Dichloroethane		6 U	5 U	5 U	4 U	6 U	5 U
1,2-Dichloroethene (total)		6 U	5 U	5 U	4 U	6 U	5 U
Chloroform		6 U	5 U	5 U	4 U	6 U	5 U
1,2-Dichloroethane		6 U	5 U	5 U	4 U	6 U	5 U
2-Butanone		11 U	9 U	10 U	9 U	11 U	10 U
1,1,1-Trichloroethane		6 U	5 U	5 U	4 U	6 U	5 U
Carbon Tetrachloride		6 U	5 U	5 U	4 U	6 U	5 U
Bromodichloromethane		6 U	5 U	5 U	4 U	6 U	5 U
1,2-Dichloropropane		6 U	5 U	5 U	4 U	6 U	5 U
cis-1,3-Dichloropropene		6 U	5 U	5 U	4 U	6 U	5 U
Trichloroethene		6 U	5 U	5 U	4 U	6 U	5 U
Dibromochloromethane		6 U	5 U	5 U	4 U	6 U	5 U
1,1,2-Trichloroethane		6 U	5 U	5 U	4 U	6 U	5 U
Benzene		6 U	5 U	5 U	4 U	6 U	5 U
Trans-1,3-Dichloropropene		6 U	5 U	5 U	4 U	6 U	5 U
Bromoform		6 U	5 U	5 U	4 U	6 U	5 U
4-Methyl-2-pentanone		11 U	9 U	10 U	9 U	11 U	10 U
2-Hexanone		6 J	9 U	10 U	9 U	11 U	2 J
Tetrachloroethene		6 U	5 U	2 J	4 U	6 U	5 U
1,1,2,2-Tetrachloroethane		6 U	5 U	5 U	4 U	6 U	5 U
Toluene		6 U	5 U	5 U	4 U	6 U	5 U

*= Outside of EPA CLP QC limits.

12/16/99

RFW Batch Number: 9910L501 Client: TNU-HANFORD B99-078 Work Order: 10985001001 Page: 2b

Cust ID:	BOWMD4	BOWMD5	BOWMD6	BOWMD7	BOWMD8	VBLKAI
RFW#:	004 REPREP	005	006	007	008	99LVH505-MB1
Chlorobenzene	6 U	5 U	5 U	4 U	6 U	5 U
Ethylbenzene	6 U	5 U	5 U	4 U	6 U	5 U
Styrene	6 U	5 U	5 U	4 U	6 U	5 U
Xylene (total)	1 J	5 U	5 U	4 U	6 U	5 U

*= Outside of EPA CLP QC limits.

2/11/00

C00026

Sample Information	Cust ID:	VBLKAI BS	VBLKWX
	RFW#:	99LVH505-MB1	99LVH507-MB1
	Matrix:	SOIL	SOIL
	D.F.:	1.00	1.00
	Units:	UG/KG	UG/KG

Surrogate Recovery	Toluene-d8	98	%	94	%
	Bromofluorobenzene	96	%	94	%
	1,2-Dichloroethane-d4	99	%	96	%
Chloromethane		10	U	10	U
Bromomethane		10	U	10	U
Vinyl Chloride		10	U	10	U
Chloroethane		10	U	10	U
Methylene Chloride		6	B	4	J
Acetone		10	U	10	U
Carbon Disulfide		5	U	5	U
1,1-Dichloroethene		92	%	5	U
1,1-Dichloroethane		5	U	5	U
1,2-Dichloroethene (total)		5	U	5	U
Chloroform		5	U	5	U
1,2-Dichloroethane		5	U	5	U
2-Butanone		10	U	10	U
1,1,1-Trichloroethane		5	U	5	U
Carbon Tetrachloride		5	U	5	U
Bromodichloromethane		5	U	5	U
1,2-Dichloropropane		5	U	5	U
cis-1,3-Dichloropropene		5	U	5	U
Trichloroethene		94	%	5	U
Dibromochloromethane		5	U	5	U
1,1,2-Trichloroethane		5	U	5	U
Benzene		100	%	5	U
Trans-1,3-Dichloropropene		5	U	5	U
Bromoform		5	U	5	U
4-Methyl-2-pentanone		10	U	10	U
2-Hexanone		10	U	10	U
Tetrachloroethene		5	U	5	U
1,1,2,2-Tetrachloroethane		5	U	5	U
Toluene		99	%	5	U

*= Outside of EPA CLP QC limits.

12-08-99

000027

RFW Batch Number: [illegible]

	Cust ID: VBLKAI BS		VBLKWX	
	RFW#: 99LVH505-MB1		99LVH507-MB1	
Chlorobenzene	99	%	5	U
Ethylbenzene	5	U	5	U
Styrene	5	U	5	U
Xylene (total)	5	U	5	U

*= Outside of EPA CLP QC limits.

2/11/00

000028

Recra LabNet - Lionville Laboratory

GC SCAN

Report Date: 11/16/99 17:08

RFW Batch Number: 9910L501 Client: TNU-HANFORD B99-078 Work Order: 10985-001-001-9999-00 Page: 1

03

	Cust ID:	BOWMD1		BOWMD1		BOWMD1		BOWMD2		BOWMD3		BOWMD4	
Sample Information	RFW#:	001		001 MS		001 MSD		002		003		004	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	D.F.:	1.00		1.00		1.00		1.00		1.00		1.00	
	Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
			fl		fl		fl		fl		fl		fl
n-Propyl Alcohol		5.0	UJ	93	%	103	%	5.0	UJ	5.5	UJ	5.0	UJ
Ethanol		5.0	UJ	5.0	U	5.0	U	5.0	UJ	5.5	UJ	5.0	UJ

	Cust ID:	BOWMD5		BOWMD6		BOWMD7		BOWMD8		BLK		BLK BS	
Sample Information	RFW#:	005		006		007		008		99LLC168-MB1		99LLC168-MB1	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	D.F.:	1.00		1.00		1.00		1.00		1.00		1.00	
	Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
			fl		fl		fl		fl		fl		fl
n-Propyl Alcohol		5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	U	131	%
Ethanol		5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	U	5.0	U

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not requested. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of Advisory limits.

2/11/00

000243

Recra LabNet - Lionville Laboratory

DIESEL RANGE ORGANICS BY GC

Report Date: 11/18/99 08:53

RFW Batch Number: 9910L501 Client: TNU-HANFORD B99-078 Work Order: 10985-001-001-9999-00 Page: 1

	Cust ID:	BOWMD1	BOWMD1	BOWMD1	BOWMD2	BOWMD3	BOWMD4
Sample Information	RFW#:	001	001 MS	001 MSD	002	003	004
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	10.0
	Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Surrogate:	p-Terphenyl	65 %	62 %	50 %	66 %	80 %	D %
Diesel Range Organics		6.5	101 %	92 %	4.3 U	4.4 U	45 UR
Motor Oil		78	130	85	130	47 U	1100 J

	Cust ID:	BOWMD5	BOWMD6	BOWMD7	BOWMD8	BLK	BLK BS
Sample Information	RFW#:	005	006	007	008	99LE1311-MB1	99LE1311-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Surrogate:	p-Terphenyl	77 %	87 %	77 %	80 %	93 %	94 %
Diesel Range Organics		4.2 U	4.4 U	4.2 U	4.2 U	4.0 U	93 %
Motor Oil		39 J	47 U	45 U	45 U	42 U	42 U

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not requested. NS= Not spiked. %= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of Advisory limits.

000020

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-078
RFW # : 9910L501
SDG/SAF #: H0590/B99-078

W.O. #: 10985-001-001-9999-00
Date Received: 10-23-99

GC/MS VOLATILE

Eight (8) soil samples were collected on 10-21-99.

The samples and their associated QC samples were analyzed according to criteria set forth in Recra OPs based on SW 846 Method 8260A for TCL Volatile target compounds on 11-01-99.

The following is a summary of the QC results accompanying these sample results and a description of any problems encountered during their analyses:

1. The cooler temperatures upon receipt have been recorded on the chain-of-custody.

2. The required holding time for analysis was met.

3. Non-target compounds were not detected in the samples.

4. Two (2) of forty-two (42) surrogate recoveries were outside EPA QC limits. The analysis of sample B0WMD4 fulfills the reanalysis requirement for sample B0WMD4 RE.

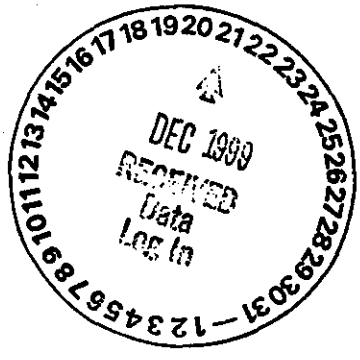
5. All matrix spike recoveries were within EPA QC limits.

6. All blank spike recoveries were within EPA QC limits.

7. The method blanks contained the common laboratory contaminants Methylene Chloride at levels less than the CRQL. The method blank 99LVH505-MB1 also contained the target compound 2-Hexanone at a level less than the CRQL.

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

12-10-99
Date



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01

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client: TNU HANFORD B99-078
RFW #: 9910L501
SDG/SAF#: H0590/B99-078

W.O. #: #: 10985-001-001-9999-00
Date Received: 10-23-99

GC SCAN

The set of samples consisted of eight (8) soil samples collected on 10-21-99.

The samples and their associated QC samples were prepared on 11-03-99 and analyzed by methodology based on EPA Method 8015B for Ethanol and 1-Propanol on 11-04-99.

The following is a summary of the QC results accompanying these sample results and a description of any problems encountered during their analyses:

1. The samples were packaged and stored as specified in the method protocol; the cooler temperature upon receipt has been recorded on the chain-of-custody.

2. The required holding time for analysis was met.

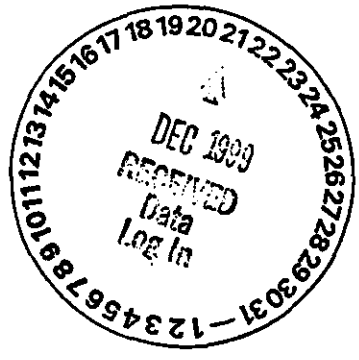
3. All initial calibrations associated with this data set were within acceptance criteria.

4. All continuing calibration standards analyzed prior to the sample extracts were within acceptance criteria.

5. Surrogates were not used for this analysis.

6. All blank spike recoveries were within advisory control limits of 50%-150%.

7. All matrix spike recoveries were within advisory control limits of 50%-150%.



J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

11-22-99
Date

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RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-078
RFW# : 9910L501
SDG/SAF#: H0590/B99-078

W.O #: 10985-001-001-9999-00
Date Received: 10-23-99

DIESEL RANGE ORGANICS

The set of samples consisted of eight (8) soil samples collected on 10-21-99.

The sample and its associated QC samples were prepared on 10-28-99 and analyzed by methodology based on EPA Method 8015B for Diesel Range Petroleum Hydrocarbons on 11-11,12-99. The analysis met the intent of method WTPH-D.

1. The cooler temperature has been recorded on the chain-of-custody.

2. All required holding times for extraction and analysis were met.

3. All initial calibrations associated with this data set were within acceptance criteria.

4. All diesel continuing calibration standards analyzed prior to the sample extracts were within acceptance criteria.

5. All obtainable surrogate recoveries were within acceptance criteria.

6. The blank spike recovery was within acceptance criteria.

7. All matrix spike recoveries were within acceptance criteria.

8. Sample BOWMD4 required a ten-fold instrument dilution due to the presence of high levels of target analytes.

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

11-22-99
Date

DEC 1999
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Data
Log In

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Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-144	Page 1 of 1

Collector Bowers/Trice	**Company Contact** Chris Cearlock **Telephone No.** 372-9574	**Project Coordinator** TRENT, SJ	**Price Code** 8N **Data Turnaround** 45 Days
Project Designation 200 Area Source characterization - 200-CW-1 OU	**Sampling Location** 200 B pond	**SAF No.** B99-078	
Ice Chest No. ERC 99 012 / ERC99023	**Field Logbook No.** EL-1511	**Method of Shipment** FED EX	
Shipped To TMA/RECRA DAB 10-21-99	**Offsite Property No.** N/A	**Bill of Lading/Air Bill No.** N/A	
		COA B20CW1671C	

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
	Type of Container	aG	aG	aG	aG	aG	aG	aG			
Special Handling and/or Storage	No. of Container(s) / Volume	1 / 60mL	1 / 250mL	1 / 250mL	1 / 500mL	1 / 500mL	1 / 1000mL	1 / 1000mL			
SAMPLE ANALYSIS		Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			

Sample No.	Matrix *	Sample Date	Sample Time									
BOWMD1	Soil	10-21-99	1012		X	X	X	X	X		Bowg99	
BOWMD2	Soil	10-21-99	1017		X	X	X	X	X		Bowg99	
BOWMD3	Soil	10-21-99	1047		X	X	X	X	X		Bowg00	
BOWMD4	Soil	10-21-99	1102		X	X	X	X	X		Bowg00	
BOWMD5	Soil	10-21-99	1118	RF	X	X	X	X	X		Bowg99	Field Samples

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By	Doug Bowers	10-21-99/1400
Received By	Ref 3C	10-21-99/1400
Relinquished By	Ref 3C	10-22-99/0800
Received By	[illegible]	10-22-99
Relinquished By	[illegible]	10-22-99/1330
Received By	Fed Ex	
Relinquished By	Fed Ex	10/23/99 1000
Received By	[illegible]	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196

(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010

(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-145	Page 1 of 1

Collector Bowers/Trice	Company Contact Chris Cearlock	Telephone No. 372-9574	Project Coordinator TRENT, SJ
Project Designation 200 Area Source characterization - 200-CW-1 OU	Sampling Location 200 B pond		SAF No. B99-078
Ice Chest No. ERC 96.025	Field Logbook No. EL-1511		Method of Shipment FED EX
Shipped To TMA/RECRA B70 10-21-99	Offsite Property No. A00 0005		Bill of Lading/Air Bill No. 42357953 0966

Price Code 8N — Data Turnaround 45 Days

COA B20CW1 671C

POSSIBLE SAMPLE HAZARDS/REMARKS Special Handling and/or Storage	Preservation	None	None	None	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	aG	aG	aG	aG	aG	aG	aG	aG	aG	aG
	No. of Container(s)	1	1	1	1	1	1	1	1	1	1
	Volume	60mL	60mL	60mL	120mL	250mL	250mL	500mL	500mL	1000mL	1000mL
SAMPLE ANALYSIS		Isotopic Uranium	Nickel-63	Technetium-99	Tritium - H3	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time										
Bowm D6	Soil	10-21-99	1130					X	X	X	X	X	
Bowm D7	Soil	10-21-99	1140					X	X	X	X	X	
Bowm D8	Soil	10-21-99	1150					X	X	X	X	X	

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By (Dave Bowers)	Dave Bowers	10-21-99/1400
Received By	Ref 3C	10-21-99/1400
Relinquished By	Ref 3C	10-22-99/0800
Received By	R. Thoren/Rikki Thoren	10-22-99/0800
Relinquished By	Rikki Thoren R. Thoren	10-22-99/1430
Received By	FED EX	
Relinquished By	Fed Ex	10-23-99 1000
Received By	Kelli Kennedy	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; ICP Metals - 6010A (Supertrace Add-On) {Beryllium, Copper, Nickel, Vanadium, Zinc}; Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241}; Strontium-89,90 -- Total Sr; Total Uranium {Uranium}; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Americium-241

use Bowers as TA. to ship

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
			9910L501
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-078-144	Page 1 of 1

Collector Bowers/Trice	**Company Contact** Chris Cearlock **Telephone No.** 372-9574	**Project Coordinator** TRENT, SJ	**Price Code** 8N **Data Turnaround** 45 Days
Project Designation 200 Area Source characterization - 200-CW-1 OU	**Sampling Location** 200 B pond	**SAF No.** B99-078	
Ice Chest No. ERC 96-025	**Field Logbook No.** EL-1511	**Method of Shipment** FED EX	
Shipped To TMA/REDRA $ TBD 11-99	**Offsite Property No.** A000005	**Bill of Lading/Air Bill No.** 42357953 09466	
		COA B20CW1 671C	

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
	Type of Container	sG	sG	sG	sG	sG	sG	sG			
	No. of Container(s)	1	1	1	1	1	1	1			
Special Handling and/or Storage	Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL			
SAMPLE ANALYSIS		Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions	See item (3) in Special Instructions			

Sample No.	Matrix *	Sample Date	Sample Time									
BOWMD1	Soil	10-21-99	1012	X						X	BOWMT9	
BOWMD2	Soil	10-21-99	1017	X						X	BOWMT9	
BOWMD3 BK	Soil	10-21-99	1047	X						X 10.22.99	BOWMW0	
BOWMD4	Soil	10-21-99	1102	X					BK	X	BOWMW0	
BOWMD5	Soil	10-21-99	1118	X						X	BOWMD9	

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Ref 3C	10-22-99/0800	Rikki Thorer	10-22-99/0800
Rikki Thorer	10-22-99/1430	FED EX	
FedEx	10-23-99 1000	Cindy Cox	10-23-99 1000

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 200-CW-1			DATA PACKAGE: H0590		
VALIDATOR: TLI		LAB: RecRA		DATE: 1/31/00	
CASE:			SDG: H0590		

ANALYSES PERFORMED					
☐ CLP Volatiles	☐ SW-846 8240 (cap column)	☒ SW-846 8260 (packed column)	☐ CLP Semivolatiles	☐ SW-846 8270 (cap column)	☐ SW-846 (packed column)
☐	☐	☐	☐	☐	☐

SAMPLES/MATRIX BOWMD1 BOWMD2 BOWMD3 BOWMD4
BOWMD5 BOWMD6 BOWMD7 BOWMD8

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. INSTRUMENT TUNING AND CALIBRATION

Is the GC/MS tuning/performance check acceptable? . . . . Yes No (N/A)

Are initial calibrations acceptable? . . . . Yes No (N/A)

Are continuing calibrations acceptable? . . . . Yes No (N/A)

Comments:

4. BLANKS

Were laboratory blanks analyzed? . . . . (Yes) No N/A

Are laboratory blank results acceptable? . . . . Yes (No) N/A

Were field/trip blanks analyzed? . . . . Yes No (N/A)

Are field/trip blank results acceptable? . . . . Yes No (N/A)

Comments: methylene Chloride ~~D4-U at level +~~ - U at 10 all ~~[illegible]~~ all U at current level
2-hexanone ~~[illegible]~~ OK

5. ACCURACY

Were surrogates/System Monitoring Compounds analyzed? . . . . . (Yes) No N/A

Are surrogate/System Monitoring Compound recoveries acceptable? (Yes) No N/A

Were MS/MSD samples analyzed? . . . . (Yes) No N/A

Are MS/MSD results acceptable? . . . . (Yes) No N/A

Comments:

GC/MS ORGANIC DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? . . . . . (Yes) No N/A

Are field duplicate RPD values acceptable? . . . . . (Yes) No N/A

Are field split RPD values acceptable? . . . . . Yes No (N/A)

Comments: _____

7. SYSTEM PERFORMANCE

Were internal standards analyzed? . . . . . Yes No (N/A)

Are internal standard areas acceptable? . . . . . Yes No (N/A)

Are internal standard retention times acceptable? . . . . . Yes No (N/A)

Comments: _____

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . . Yes No (N/A)

Is compound quantitation acceptable? . . . . . Yes No (N/A)

Comments: _____

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? . . . . . (Yes) No N/A

Are all results supported in the raw data? . . . . . Yes No (N/A)

Do results meet the CRQLs? . . . . . Yes (No) N/A

Has the laboratory properly identified and coded all TIC? . . . Yes No (N/A)

Comments: Chloromethane, Bromomethane, vinyl chloride, chloroethane in D1, D4, D8 Acetone - D1, D4, D8 2-Butanone - D1, D4, D8 4 methyl 2 pentanone, 2-Hexanone - D1, D4, D8

GENERAL GC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C) circled	D	E
PROJECT: 200-CW-1			DATA PACKAGE: H0590		
VALIDATOR: TLI	LAB: RecRA		DATE: 1/31/00		
CASE:			SDG: H0590		
Diesel + Motor oil		ANALYSES PERFORMED			
☐ 8010	☒ 8015 B	☐ 8020	☐ 8021	8140	8141
☐ 8150	☐ 8151	☐ WTPH-HCID	☐ WTPH-G	☐ WTPH-D	☐
☐	☐	☐	☐	☐	☐
SAMPLES/MATRIX:	B0WMD1	B0WMD2	B0WMD3	B0WMD4	
	B0WMD5	B0WMD6	B0WMD7	B0WMD8	
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . Yes No (N/A)

Is a case narrative present? . . . . (Yes) No N/A

Comments:

2. HOLDING TIMES

Are sample holding times acceptable? . . . . (Yes) No N/A

Comments:

000099

GENERAL GC DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

3.1 INITIAL CALIBRATION

Was an initial calibration performed? . . . . . Yes No N/A

Are %RSD values for calibration or response factors acceptable? . . . . . Yes No N/A

Comments:_____

_____

_____

_____

_____

3.2 CONTINUING CALIBRATION

Was a continuing calibration check performed? . . . . . Yes No N/A

Are %D values for calibration or response factors acceptable? . Yes No N/A

Comments:_____

_____

_____

_____

_____

4. BLANKS

Were laboratory blanks analyzed? . . . . . Yes No N/A

Are laboratory blank results acceptable? . . . . . Yes No N/A

Were field/trip blanks analyzed? . . . . . Yes No N/A

Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments:_____

_____

_____

_____

_____

5. ACCURACY

Were surrogates analyzed? . . . . . Yes No N/A

Are surrogate recoveries acceptable? . . . . . Yes No N/A

Were MS/MSD samples analyzed? . . . . . Yes No N/A

Are MS/MSD recoveries acceptable? . . . . . Yes No N/A

Were LCS samples analyzed? . . . . . Yes No N/A

Are LCS recoveries acceptable? . . . . . Yes No N/A

GENERAL GC DATA VALIDATION CHECKLIST

Comments: D4 - diluted out
Diesel R
MO. J

6. PRECISION

Are MS/MSD sample RPD values acceptable? . . . . . Yes No N/A
Are field duplicate RPD values acceptable? . . . . . Yes No N/A
Are field split RPD values acceptable? . . . . . Yes No N/A
Comments: Matrix out RPD 50%

7. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . . Yes No N/A
Is compound quantitation acceptable? . . . . . Yes No N/A
Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A
Are all results supported in the raw data? . . . . . Yes No N/A
Do results meet the CRQLs? . . . . . Yes No N/A
Comments:

GENERAL GC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 200cw1			DATA PACKAGE: H0590		
VALIDATOR: TY		LAB: RecRA		DATE: 1/31/00	
CASE:			SDG: H0590		

Alcohol

ANALYSES PERFORMED					
☐ 8010	☐ 8015B	☐ 8020	☐ 8021	8140	8141
☐ 8150	☐ 8151	☐ WTPH-HCID	☐ WTPH-G	☐ WTPH-D	☐
☐	☐	☐	☐	☐	☐

SAMPLES/MATRIX: B0WMD1 B0WMD2 B0WMD3 B0WMD4
B0WMD5 B0WMD6 B0WMD7 B0WMD8

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . Yes No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

A-102

GENERAL GC DATA VALIDATION CHECKLIST

3. INSTRUMENT CALIBRATION

3.1 INITIAL CALIBRATION

Was an initial calibration performed? . . . . . Yes No (N/A)

Are %RSD values for calibration or response factors acceptable? . . . . . Yes No (N/A)

Comments:_____

_____

_____

_____

_____

3.2 CONTINUING CALIBRATION

Was a continuing calibration check performed? . . . . . Yes No (N/A)

Are %D values for calibration or response factors acceptable? . Yes No (N/A)

Comments:_____

_____

_____

_____

_____

4. BLANKS

Were laboratory blanks analyzed? . . . . . (Yes) No N/A

Are laboratory blank results acceptable? . . . . . (Yes) No N/A

Were field/trip blanks analyzed? . . . . . (Yes) No N/A

Are field/trip blank results acceptable? . . . . . (Yes) No N/A

Comments:_____

_____

_____

_____

_____

5. ACCURACY

Were surrogates analyzed? . . . . . Yes (No) N/A

Are surrogate recoveries acceptable? . . . . . Yes No (N/A)

Were MS/MSD samples analyzed? . . . . . (Yes) No N/A

Are MS/MSD recoveries acceptable? . . . . . (Yes) No N/A

Were LCS samples analyzed? . . . . . Yes No (N/A)

Are LCS recoveries acceptable? . . . . . Yes No (N/A)

GENERAL GC DATA VALIDATION CHECKLIST

Comments: No surrogate -J all

6. PRECISION

Are MS/MSD sample RPD values acceptable? . . . . . (Yes) No N/A

Are field duplicate RPD values acceptable? . . . . . (Yes) No N/A

Are field split RPD values acceptable? . . . . . Yes No (N/A)

Comments:

7. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . . Yes No (N/A)

Is compound quantitation acceptable? . . . . . Yes No (N/A)

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . (Yes) No N/A

Are all results supported in the raw data? . . . . . Yes No (N/A)

Do results meet the CRQLs? . . . . . Yes No (N/A)

Comments:

Date: 15 February 2000
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 200 Area Source Characterization - 200-CW-1 Operable Unit
Subject: Radiochemistry - Data Package No. H0590-TNU (SDG No. H0590)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0590-TNU which was prepared by Thermo NUtech (TNU). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B0WMD1	10/21/99	Soil	C	See note 1
B0WMD2	10/21/99	Soil	C	See note 1
B0WMD3	10/21/99	Soil	C	See note 1 & 3
B0WMD4	10/21/99	Soil	C	See note 1
B0WMD5	10/21/99	Soil	C	See note 1
B0WMD6	10/21/99	Soil	C	See note 1 & 2
B0WMD7	10/21/99	Soil	C	See note 1 & 2
B0WMD8	10/21/99	Soil	C	See note 1 & 2

1 - Strontium-90; alpha spectroscopy (isotopic plutonium, isotopic thorium and americium-241); gamma spectroscopy; total uranium.
2 - Tritium; nickel-63; technetium-99
3 - Alpha spectroscopy (isotopic uranium)

Data validation was conducted in accordance with the BHI validation statement of work and the *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*, DOE/RL-99-07, Draft B. Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months with analysis within 7 days of distillation for liquid scintillation counting.

  All holding times were acceptable.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the RDL, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  All laboratory blank results were acceptable.

- **Accuracy**

  Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery range is 70-130% (80-120% for gamma spectroscopy). In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

  Due to the sample not being analyzed with the SDG, the strontium-90 and gamma spectroscopy results in sample B0WMD2 were qualified as estimates and flagged "J".

Due to the LCS not being analyzed with the SDG, all americium-241 (aspec) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to an RPD of 40%, all thorium-228 (aspec) results were qualified as estimates and flagged "J".

Due to an RPD of 43%, all thorium-230 (aspec) results were qualified as estimates and flagged "J".

Due to the duplicate not being analyzed with the SDG, all strontium-90 results were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples (samples B0WMD1/B0WMD2) were submitted to RLN for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels are compared against contract required MDAs to ensure that laboratory detection levels meet the required criteria. The reported detection limit exceeded the contract required MDA for the following: Europium-152 in samples B0WMD1, B0WMD2, B0WMD3 and B0WMD4;

europium-155 in samples B0WMD1, B0WMD2, B0WMD3 and B0WMD5. Under the BHI statement of work, no qualification is required. All other reported laboratory detection levels met the analyte specific MDA.

- **Completeness**

  Data Package No. H0590 (SDG No. H0590) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to an RPD of 43%, all thorium-230 (aspec) results were qualified as estimates and flagged "J". Due to an RPD of 40%, all thorium-228 (aspec) results were qualified as estimates and flagged "J". Due to the duplicate not being analyzed with the SDG, all strontium-90 results were qualified as estimates and flagged "J". Due to the sample not being analyzed with the SDG, the strontium-90 and gamma spectroscopy results in sample B0WMD2 were qualified as estimates and flagged "J". Due to the LCS not being analyzed with the SDG, all americium-241 (aspec) results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The reported detection limit exceeded the contract required MDA for the following: Europium-152 in samples B0WMD1, B0WMD2, B0WMD3 and B0WMD4; europium-155 in samples B0WMD1, B0WMD2, B0WMD3 and B0WMD5. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-07, Draft B, *200-CW-1 Operable Unit RI/FS Work Plan and 216-B-3 RCRA TSD Unit Sampling Plan*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0590	REVIEWER: TLI	DATE: 2/15/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Thorium-228 (aspec)	J	All	RPD
Thorium-230 (aspec)	J	All	RPD
Americium-241(aspec)	J	All	LCS not analyzed w/SDG
Strontium-90	J	All	Duplicate not analyzed w/SDG
Strontium-90, gamma spectroscopy	J	B0WMD2	Sample not analyzed w/SDG

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (PCi/G)

Project: BECHTEL-HANFORD																	
Laboratory: TNU																	
Case	SDG: H0590																
Sample Number		B0WMD1		B0WMD2		B0WMD3		B0WMD4		B0WMD5		B0WMD6		B0WMD7		B0WMD8	
Location		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond		B Pond	
Remarks				Duplicate													
Sample Date		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99		10/21/99	
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Tritium	400	NA		NA		NA		NA		NA		-0.048	U	-0.026	U	-0.051	U
Technetium-99	15	NA		NA		NA		NA		NA		-0.101	U	0.114	U	-0.123	U
Total Uranium*	1	1.33		0.560		2.38		0.692		0.507		0.384		0.350		0.326	
Plutonium-238	1	0.005	U	0.017	U	0.003	U	0.009	U	0.003	U	0.007	U	0	U	0.003	U
Plutonium-239/240	1	0.126		0.114		0.024	U	0.122		0.058		-0.007	U	0	U	0.019	U
Nickel-63	30	NA		NA		NA		NA		NA		0.427	U	0.688	U	0.613	U
Americium-241	1	0.966	J	1.14	J	0.337	J	1.32	J	0.381	J	0.037	UJ	0.013	UJ	0.015	UJ
Total Strontium	1	12100	J	9950	J	1580	J	996	J	364	J	4.03	J	4.82	J	0.656	J
Thorium-228		0.414	J	0.845	J	0.204	J	0.867	J	0.528	J	0.378	J	0.347	J	0.386	J
Thorium-230		0.458	J	0.861	J	0.310	J	0.797	J	0.536	J	0.506	J	0.680	J	0.150	UJ
Thorium-232	1	0.428		0.684		0.229		0.866		0.552		0.356		0.371		0.246	
Potassium-40		13.3		13.4	J	12.5		13.3		11.7		12.4		12.8		13.4	
Cobalt 60	0.1	U	U	U	UJ	U	U.	U	U	U	U	U	U	U	U	U	U
Cesium 137	0.1	721		746	J	13.4		103		20.4		0.157		0.472		0.075	
Europium 152	0.2	U	U	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U
Europium 154	0.2	1.82		1.87	J	0.538		2.34		0.301		U	U	U	U	U	U
Europium 155	0.1	U	U	U	UJ	U	U	2.04		0.241	U	U	U	U	U	U	U
Radium-226		0.650		0.690	J	0.690		0.740		0.520		0.484		0.369		0.452	
Radium-228		0.718		0.699	J	1.00		0.819		0.748		0.782		0.606		0.697	
Thorium-228		1.05		0.819	J	0.994		0.863		0.608		0.678		0.541		0.653	
Thorium-232		0.718		0.699	J	1.00		0.819		0.748		0.782		0.606		0.697	
Americium-241 (gea)		U	U	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U
Uranium-238 (gea)		U	U	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U
Uranium-235 (gea)		U	U	U	UJ	U	U	U	U	U	U	U	U	U	U	U	U
Uranium-233 (Aspec)		NA		NA		0.585		NA		NA		NA		NA		NA	
Uranium-235 (Aspec)		NA		NA		0.040		NA		NA		NA		NA		NA	
Uranium-238 (Aspec)		NA		NA		0.564		NA		NA		NA		NA		NA	
* - Units are UG/G																	

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0590

N910196-01 B0WMD1

DATA SHEET

SDG	7257	Client/Case no	Hanford SDG H0590
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	N910196-01	Client sample id	B0WMD1
Dept sample id	7257-001	Location/Matrix	200 B Pond SOLID
Received	10/25/99	Collected	10/21/99 10:12
% solids	91.7	Custody/SAF No	B99-078-144 B99-078

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Total Uranium (ug/g)	7440-61-1	1.33	0.17	0.005	1.0		U_T
Plutonium 238	13981-16-3	0.005	0.011	0.026	1.0	U	PU
Plutonium 239/240	PU-239/240	0.126	0.038	0.030	1.0		PU
Americium 241	14596-10-2	0.966	0.15	0.037	1.0	J	AM
Total Strontium	SR90	12100	130	2.8	1.0	J	SR
Thorium 228	14274-82-9	0.414	0.14	0.13	1.0	J	TH
Thorium 230	14269-63-7	0.458	0.15	0.17	1.0	J	TH
Thorium 232	TH-232	0.428	0.12	0.057	1.0		TH
Potassium 40	13966-00-2	13.3	0.78	0.41			GAM
Cobalt 60	10198-40-0	U		0.040	0.050	U	GAM
Cesium 137	10045-97-3	721	0.80	0.29	0.10		GAM
Europium 152	14683-23-9	U		0.82	0.10	U	GAM
Europium 154	15585-10-1	1.82	0.18	0.19	0.10		GAM
Europium 155	14391-16-3	U		2.5	0.10	U	GAM
Radium 226	13982-63-3	0.650	0.21	0.31	0.10		GAM
Radium 228	15262-20-1	0.718	0.27	0.35	0.20		GAM
Thorium 228	14274-82-9	1.05	0.30	0.45			GAM
Thorium 232	TH-232	0.718	0.27	0.35			GAM
Americium 241	14596-10-2	U		24		U	GAM
Uranium 238	U-238	U		8.3		U	GAM
Uranium 235	15117-96-1	U		1.1		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/11/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	01/12/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0590

N910196-02 B0WMD2

DATA SHEET

SDG	7257	Client/Case no	Hanford SDG H0590
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	N910196-02	Client sample id	B0WMD2
Dept sample id	7257-002	Location/Matrix	200 B Pond SOLID
Received	10/25/99	Collected	10/21/99 10:17
% solids	92.4	Custody/SAF No	B99-078-144 B99-078

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Total Uranium (ug/g)	7440-61-1	0.560	0.072	0.005	1.0		U_T
Plutonium 238	13981-16-3	0.017	0.021	0.038	1.0	U	PU
Plutonium 239/240	PU-239/240	0.114	0.042	0.038	1.0		PU
Americium 241	14596-10-2	1.14	0.17	0.045	1.0	J	AM
Total Strontium	SR90	9950	160	6.7	1.0	J	SR
Thorium 228	14274-82-9	0.845	0.19	0.14	1.0	J	TH
Thorium 230	14269-63-7	0.861	0.19	0.15	1.0	J	TH
Thorium 232	TH-232	0.684	0.15	0.065	1.0		TH
Potassium 40	13966-00-2	13.4	0.72	0.47		J	GAM
Cobalt 60	10198-40-0	U		0.047	0.050	U	GAM
Cesium 137	10045-97-3	746	1.1	0.38	0.10		GAM
Europium 152	14683-23-9	U		1.1	0.10	U	GAM
Europium 154	15585-10-1	1.87	0.25	0.24	0.10		GAM
Europium 155	14391-16-3	U		2.8	0.10	U	GAM
Radium 226	13982-63-3	0.690	0.33	0.46	0.10		GAM
Radium 228	15262-20-1	0.699	0.33	0.41	0.20		GAM
Thorium 228	14274-82-9	0.819	0.38	0.56			GAM
Thorium 232	TH-232	0.699	0.33	0.41			GAM
Americium 241	14596-10-2	U		3.7		U	GAM
Uranium 238	U-238	U		11		U	GAM
Uranium 235	15117-96-1	U		1.8		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/11/00

Lab id	TMANC
Protocol	Hanford
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Report date	01/12/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0590

N910196-03 B0WMD3

DATA SHEET

SDG	7257	Client/Case no	Hanford SDG H0590
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	N910196-03	Client sample id	B0WMD3
Dept sample id	7257-003	Location/Matrix	200 B Pond SOLID
Received	10/25/99	Collected	10/21/99 10:47
% solids	92.3	Custody/SAF No	B99-078-144 B99-078

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233	U233/234	0.585	0.059	0.017	1.0		U
Uranium 235	15117-96-1	0.040	0.016	0.012	1.0		U
Uranium 238	U238	0.564	0.057	0.018	1.0		U
Total Uranium (ug/g)	7440-61-1	2.38	0.30	0.005	1.0		U_T
Plutonium 238	13981-16-3	0.003	0.012	0.023	1.0	U	PU
Plutonium 239/240	PU-239/240	0.024	0.018	0.029	1.0	U	PU
Americium 241	14596-10-2	0.337	0.082	0.042	1.0	J	AM
Total Strontium	SR90	1580	61	3.4	1.0	J	SR
Thorium 228	14274-82-9	0.204	0.11	0.16	1.0	J	TH
Thorium 230	14269-63-7	0.310	0.15	0.16	1.0	J	TH
Thorium 232	TH-232	0.229	0.098	0.062	1.0		TH
Potassium 40	13966-00-2	12.5	0.81	0.43			GAM
Cobalt 60	10198-40-0	U		0.044	0.050	U	GAM
Cesium 137	10045-97-3	13.4	0.19	0.11	0.10		GAM
Europium 152	14683-23-9	U		0.30	0.10	U	GAM
Europium 154	15585-10-1	0.538	0.20	0.19	0.10		GAM
Europium 155	14391-16-3	U		0.47	0.10	U	GAM
Radium 226	13982-63-3	0.690	0.15	0.16	0.10		GAM
Radium 228	15262-20-1	1.00	0.35	0.32	0.20		GAM
Thorium 228	14274-82-9	0.994	0.17	0.21			GAM
Thorium 232	TH-232	1.00	0.35	0.32			GAM
Americium 241	14596-10-2	U		0.52		U	GAM
Uranium 238	U-238	U		8.7		U	GAM
Uranium 235	15117-96-1	U		0.64		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/11/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
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Report date 01/12/00

DATA SHEET

SDG	7257	Client/Case no	Hanford SDG H0590
Contact	Melissa C. Mannion	Contract	TRB-SEB-207925
Lab sample id	N910196-04	Client sample id	B0WMD4
Dept sample id	7257-004	Location/Matrix	200 B Pond SOLID
Received	10/25/99	Collected	10/21/99 11:02
% solids	89.4	Custody/SAF No	B99-078-144 B99-078

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Total Uranium (ug/g)	7440-61-1	0.692	0.089	0.005	1.0	J	U_T
Plutonium 238	13981-16-3	0.009	0.018	0.028	1.0	U	PU
Plutonium 239/240	PU-239/240	0.122	0.042	0.033	1.0	J	PU
Americium 241	14596-10-2	1.32	0.16	0.056	1.0	J	AM
Total Strontium	SR90	996	36	4.6	1.0	J	SR
Thorium 228	14274-82-9	0.867	0.19	0.18	1.0	J J	TH
Thorium 230	14269-63-7	0.797	0.19	0.15	1.0	J J	TH
Thorium 232	TH-232	0.866	0.18	0.083	1.0	J	TH
Potassium 40	13966-00-2	13.3	0.87	0.51			GAM
Cobalt 60	10198-40-0	U		0.047	0.050	U	GAM
Cesium 137	10045-97-3	103	0.50	0.19	0.10		GAM
Europium 152	14683-23-9	U		0.55	0.10	U	GAM
Europium 154	15585-10-1	2.34	0.24	0.21	0.10		GAM
Europium 155	14391-16-3	2.04	0.41	0.59	0.10		GAM
Radium 226	13982-63-3	0.740	0.23	0.31	0.10		GAM
Radium 228	15262-20-1	0.819	0.22	0.26	0.20		GAM
Thorium 228	14274-82-9	0.863	0.20	0.28			GAM
Thorium 232	TH-232	0.819	0.22	0.26			GAM
Americium 241	14596-10-2	U		1.9		U	GAM
Uranium 238	U-238	U		8.3		U	GAM
Uranium 235	15117-96-1	U		0.78		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/11/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
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Version	3.06
Report date	01/12/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0590

N910196-05 B0WMD5

DATA SHEET

SDG 7257	Client/Case no Hanford	SDG H0590	
Contact Melissa C. Mannion	Contract TRB-SBB-207925		
Lab sample id N910196-05	Client sample id B0WMD5		
Dept sample id 7257-005	Location/Matrix 200 B Pond	SOLID	
Received 10/25/99	Collected 10/21/99 11:18		
% solids 94.6	Custody/SAF No B99-078-144	B99-078	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Total Uranium (ug/g)	7440-61-1	0.507	0.10	0.005	1.0		U_T
Plutonium 238	13981-16-3	0.003	0.011	0.021	1.0	U	PU
Plutonium 239/240	PU-239/240	0.058	0.028	0.027	1.0		PU
Americium 241	14596-10-2	0.381	0.087	0.051	1.0	J	AM
Total Strontium	SR90	364	1.6	0.10	1.0	J	SR
Thorium 228	14274-82-9	0.528	0.16	0.18	1.0	J	TH
Thorium 230	14269-63-7	0.536	0.16	0.16	1.0	J	TH
Thorium 232	TH-232	0.552	0.13	0.062	1.0		TH
Potassium 40	13966-00-2	11.7	0.55	0.25			GAM
Cobalt 60	10198-40-0	U		0.028	0.050	U	GAM
Cesium 137	10045-97-3	20.4	0.17	0.060	0.10		GAM
Europium 152	14683-23-9	U		0.18	0.10	U	GAM
Europium 154	15585-10-1	0.301	0.12	0.13	0.10		GAM
Europium 155	14391-16-3	0.241	0.17	0.27	0.10	U	GAM
Radium 226	13982-63-3	0.520	0.084	0.095	0.10		GAM
Radium 228	15262-20-1	0.748	0.13	0.13	0.20		GAM
Thorium 228	14274-82-9	0.608	0.062	0.088			GAM
Thorium 232	TH-232	0.748	0.13	0.13			GAM
Americium 241	14596-10-2	U		0.62		U	GAM
Uranium 238	U-238	U		4.1		U	GAM
Uranium 235	15117-96-1	U		0.30		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/11/00

Lab id	TMANC
Protocol	Hanford
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Report date	01/12/00

DATA SHEET

SDG 7257 Client/Case no Hanford SDG H0590
Contact Melissa C. Mannion Contract TRB-SBB-207925

Lab sample id N910196-06 Client sample id B0WMD6
Dept sample id 7257-006 Location/Matrix 200 B Pond SOLID
Received 10/25/99 Collected 10/21/99 11:30
% solids 90.2 Custody/SAF No B99-078-145 B99-078

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.048	0.057	0.099	400	U	H
Technetium 99	14133-76-7	-0.101	0.27	0.62	15	U	TC
Total Uranium (ug/g)	7440-61-1	0.384	0.049	0.005	1.0		U_T
Plutonium 238	13981-16-3	0.007	0.007	0.027	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.007	0.014	0.039	1.0	U	PU
Nickel 63	13981-37-8	0.427	1.4	2.3	30	U	NI_L
Americium 241	14596-10-2	0.037	0.037	0.052	1.0	U J	AM
Total Strontium	SR90	4.03	0.17	0.090	1.0	J	SR
Thorium 228	14274-82-9	0.378	0.17	0.20	1.0	J	TH
Thorium 230	14269-63-7	0.506	0.20	0.23	1.0	J	TH
Thorium 232	TH-232	0.356	0.13	0.12	1.0		TH
Potassium 40	13966-00-2	12.4	0.86	0.22			GAM
Cobalt 60	10198-40-0	U		0.022	0.050	U	GAM
Cesium 137	10045-97-3	0.157	0.028	0.031	0.10		GAM
Europium 152	14683-23-9	U		0.057	0.10	U	GAM
Europium 154	15585-10-1	U		0.079	0.10	U	GAM
Europium 155	14391-16-3	U		0.093	0.10	U	GAM
Radium 226	13982-63-3	0.484	0.048	0.044	0.10		GAM
Radium 228	15262-20-1	0.782	0.10	0.093	0.20		GAM
Thorium 228	14274-82-9	0.678	0.034	0.027			GAM
Thorium 232	TH-232	0.782	0.10	0.093			GAM
Americium 241	14596-10-2	U		0.033		U	GAM
Uranium 238	U-238	U		2.9		U	GAM
Uranium 235	15117-96-1	U		0.090		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/11/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 01/12/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0590

N910196-07 B0WMD7

DATA SHEET

SDG	7257	Client/Case no	Hanford SDG H0590
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	N910196-07	Client sample id	B0WMD7
Dept sample id	7257-007	Location/Matrix	200 B Pond SOLID
Received	10/25/99	Collected	10/21/99 11:40
% solids	95.9	Custody/SAF No	B99-078-145 B99-078

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.026	0.061	0.10	400	U	H
Technetium 99	14133-76-7	0.114	0.31	0.63	15	U	TC
Total Uranium (ug/g)	7440-61-1	0.350	0.046	0.005	1.0		U_T
Plutonium 238	13981-16-3	0	0.007	0.026	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.013	0.032	1.0	U	PU
Nickel 63	13981-37-8	0.688	1.3	2.2	30	U	NI_L
Americium 241	14596-10-2	0.013	0.013	0.025	1.0	U J	AM
Total Strontium	SR90	4.82	0.25	0.13	1.0	J	SR
Thorium 228	14274-82-9	0.347	0.17	0.23	1.0	J	TH
Thorium 230	14269-63-7	0.680	0.22	0.18	1.0	J	TH
Thorium 232	TH-232	0.371	0.15	0.095	1.0		TH
Potassium 40	13966-00-2	12.8	0.45	0.15			GAM
Cobalt 60	10198-40-0	U		0.020	0.050	U	GAM
Cesium 137	10045-97-3	0.472	0.029	0.023	0.10		GAM
Europium 152	14683-23-9	U		0.050	0.10	U	GAM
Europium 154	15585-10-1	U		0.070	0.10	U	GAM
Europium 155	14391-16-3	U		0.051	0.10	U	GAM
Radium 226	13982-63-3	0.369	0.039	0.038	0.10		GAM
Radium 228	15262-20-1	0.606	0.090	0.083	0.20		GAM
Thorium 228	14274-82-9	0.541	0.027	0.026			GAM
Thorium 232	TH-232	0.606	0.090	0.083			GAM
Americium 241	14596-10-2	U		0.064		U	GAM
Uranium 238	U-238	U		2.4		U	GAM
Uranium 235	15117-96-1	U		0.074		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/14/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	01/12/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0590

N910196-08 B0WMD8

DATA SHEET

SDG 7257 Client/Case no Hanford SDG H0590
Contact Melissa C. Mannion Contract TRB-SBB-207925

Lab sample id N910196-08 Client sample id B0WMD8
Dept sample id 7257-008 Location/Matrix 200 B Pond SOLID
Received 10/25/99 Collected 10/21/99 11:50
% solids 94.9 Custody/SAF No B99-078-145 B99-078

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.051	0.058	0.10	400	U	H
Technetium 99	14133-76-7	-0.123	0.18	0.53	15	U	TC
Total Uranium (ug/g)	7440-61-1	0.326	0.042	0.005	1.0		U_T
Plutonium 238	13981-16-3	0.003	0.006	0.021	1.0	U	PU
Plutonium 239/240	PU-239/240	0.019	0.017	0.021	1.0	U	PU
Nickel 63	13981-37-8	0.613	1.4	2.3	30	U	NI_L
Americium 241	14596-10-2	0.015	0.022	0.028	1.0	U J	AM
Total Strontium	SR90	0.656	0.12	0.13	1.0	J	SR
Thorium 228	14274-82-9	0.386	0.17	0.21	1.0	J	TH
Thorium 230	14269-63-7	0.150	0.13	0.20	1.0	U J	TH
Thorium 232	TH-232	0.246	0.11	0.12	1.0		TH
Potassium 40	13966-00-2	13.4	0.77	0.19			GAM
Cobalt 60	10198-40-0	U		0.023	0.050	U	GAM
Cesium 137	10045-97-3	0.075	0.020	0.025	0.10		GAM
Europium 152	14683-23-9	U		0.048	0.10	U	GAM
Europium 154	15585-10-1	U		0.071	0.10	U	GAM
Europium 155	14391-16-3	U		0.050	0.10	U	GAM
Radium 226	13982-63-3	0.452	0.045	0.043	0.10		GAM
Radium 228	15262-20-1	0.697	0.11	0.10	0.20		GAM
Thorium 228	14274-82-9	0.653	0.031	0.024			GAM
Thorium 232	TH-232 ,	0.697	0.11	0.10			GAM
Americium 241	14596-10-2	U		0.028		U	GAM
Uranium 238	U-238	U		2.4		U	GAM
Uranium 235	15117-96-1	U		0.081		U	GAM

200 Area Soure Chara. - 200-CW-1 OU

2/11/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 01/12/00

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H0590 was composed of eight solid samples designated under SAF No. B99-078 with a Project Designation of: 200 Area Source Characterization – 200-CW-1 OU.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Thermo Retec Sample Receipt Checklist. The results were transmitted to BHI via facsimile on January 7, 11, and 12, 2000.

2.0 ANALYSIS NOTES

2.1 Tritium Analyses

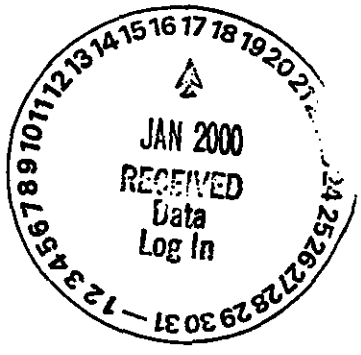
No problems were encountered during the course of the analyses.

2.2 Nickel-63 Analyses

No problems were encountered during the course of the analyses.

2.3 Total Strontium Analyses

No problems were encountered during the course of the analyses.



2.4 Technetium-99 Analyses

No problems were encountered during the course of the analyses.

2.5 Isotopic Thorium Analyses

No problems were encountered during the course of the analyses.

2.6 Total Uranium Analyses

No problems were encountered during the course of the analyses.

2.7 Isotopic Uranium Analyses

BHI requested sample B0WMD3 be analyzed for Isotopic Uranium on January 6, 2000. Sample B0WMD3 was batched with SDG H0562 (7231). All QC samples are in SDG H0562. The sample duplicate was of a sample from SDG H0562. No problems were encountered during the course of the analyses.

2.8 Isotopic Plutonium Analyses

No problems were encountered during the course of the analyses.

2.9 Americium-241 Analyses

No problems were encountered during the course of the analyses.

2.10 Gamma Spec Analyses

No problems were encountered during the course of the analyses.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-078-144 | Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock — Telephone No. 372-9574	Project Coordinator: TRENT, SJ	Price Code 8N — Data Turnaround 45 Days
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond	SAF No. B99-078	
Ice Chest No.: ERC 96040	Field Logbook No.: EL-1511	Method of Shipment: FED EX	
Shipped To: TMA/RECRA RT 10-21-99	Offsite Property No.: A00 0 004	Bill of Lading/Air Bill No.: 4235 7953 0988	
		COA B20CW1671C	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None
Type of Container	aG	aG	aG	aG	aG	aG	aG
No. of Container(s)	1	1	1	1	1	1	1
Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL
SAMPLE ANALYSIS	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.

	Sample No.	Matrix *	Sample Date	Sample Time	Isotopic U	VOA	pH	(1)	Semi-VOA	(2)	(3)			
10KN	BOWMD1	Soil	10-21-99	1012	X						X	BOW9T9	8 1002
2KN	BOWMD2	soil	10-21-99	1017	X						X	BOW9W0 T9	
4N	BOWMD3	soil	10-21-99	1047	X						X	BOW9W0	
7KN	BOWMD4	soil	10-21-99	1102	X						X	BOW9W0	
9??	~~BOWMD5~~	~~soil~~	~~10-21-99~~	~~1118~~	~~X~~		RT 10-22-99				~~X~~	~~BOWMD9~~	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
Doug Bowers / Doug Bowers	10-21-99/1400	Ref 3C	10-21-99/1400
Ref 3C	10-22-99 0800	Rikki Thoren / R Thoren	10-22-99 0802
Rikki Thoren / R Thoren	10-22-99/1430	FED EX	10-22-99
Fed Ex	10-22-99 12:00	[illegible] JRCars	10-25-99 9:00

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0000022

ANALYSIS REQUEST

B99-078-144 | Page 1 of 1

Collector Bowers/Trice	**Company Contact** Chris Cearlock	**Telephone No.** 372-9574	**Project Coordinator** TRENT, SJ
Price Code 8N	**Data Turnaround** 45 Days		
Project Designation 200 Area Source characterization - 200-CW-1 OU	**Sampling Location** 200 B pond		**SAF No.** B99-078
Ice Chest No. SML 357	**Field Logbook No.** EL-1511		**Method of Shipment** FED EX
Shipped To TMA/REDRA 10-21-99	**Offsite Property No.** A0000004		**Bill of Lading/Air Bill No.** 42357953 0977
			COA B20CW1 671C

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C	None			
Type of Container	aG	aG	aG	aG	aG	aG	aG			
No. of Container(s)	1	1	1	1	1	1	1			
Volume	60mL	250mL	250mL	500mL	500mL	1000mL	1000mL			
SAMPLE ANALYSIS	Isotopic Uranium	VOA - 8260A (TCL); VOA - 8260A (Add-On) (t-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.			

Sample No.	Matrix *	Sample Date	Sample Time									
BOWMD1	Soil	10-21-99	1012	X						X	BOW9T9	
BOWMD2	Soil	10-21-99	1017	X						X	BOW9W0	
BOWMD3	Soil	10-21-99	1047	X						X	BOW9W0	
BOWMD4	Soil	10-21-99	1102	X						X	BOW9W0	
BOWMD5	Soil	10-21-99	1118	X						X	BOWMD9	

0000023

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By / Date/Time	Received By / Date/Time
Doug Bowers 10-21-99/1700	R of 3C 10-21-99/1400
Relinquished By: Ref 3C 10.22.99/0800	Received By: RThoren/Rikki Thoren 10.22.99 0800
Relinquished By: RThoren/Rikki Thoren 1430	Received By: FED EX 10/22/99
Relinquished By: FedEx 10/23/99 12:00	Received By: TNU M. Goldmann 10/25/99 9:00

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; ICP Metals - 6010A (Supertrace Add-On) {Beryllium, Copper, Nickel, Vanadium, Zinc}; Mercury - 7471 - (CV); Chromium Hex - 7196

(2) NO2/NO3 - 353.1; IC Anions - 300.0 {Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010

(3) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Americium-241}; Strontium-89,90 -- Total Sr; Total Uranium {Uranium}; Isotopic Plutonium; Isotopic Thorium {Thorium-232}; Americium-241

Matrix *

Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-078-145

Page 1 of 1

Collector: Bowers/Trice	Company Contact: Chris Cearlock	Telephone No.: 372-9574	Project Coordinator: TRENT, SJ
Project Designation: 200 Area Source characterization - 200-CW-1 OU	Sampling Location: 200 B pond		SAF No.: B99-078
Ice Chest No.: SNL 357	Field Logbook No.: EL-1511		Method of Shipment: FED EX
Shipped To: TMA/RECRA DTB 10-21-99	Offsite Property No.: ABB 000004		Bill of Lading/Air Bill No.: 4235795 3 0977
			COA: B20CW167IC

Price Code: 8N

Data Turnaround: 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Sample No.	Matrix *	Sample Date	Sample Time	Preservation	Type of Container	No. of Container(s) / Volume	Isotopic Uranium	Nickel-63	Technetium-99	Tritium - H3	VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-Propanol, Ethanol)	pH (Soil) - 9045	See item (1) in Special Instructions.	Semi-VOA - 8270A (TCL); TPH-Diesel Range - WTPH-D; PCBs - 8082	See item (2) in Special Instructions.	See item (3) in Special Instructions.
						SAMPLE ANALYSIS										
				None	aG	1 / 60mL										
				None	aG	1 / 60mL										
				None	aG	1 / 60mL										
				None	aG	1 / 120mL										
				Cool 4C	aG	1 / 250mL										
				None	aG	1 / 250mL										
				Cool 4C	aG	1 / 500mL										
				Cool 4C	aG	1 / 500mL										
				Cool 4C	aG	1 / 1000mL										
				None	aG	1 / 1000mL										
95	BOWMD6	Soil	10-21-99	1130			X	X	X	X						X
71	BOWMD7	Soil	10-21-99	1140			X	X	X	X						X
60	BOWMD8	Soil	10-21-99	1150			X	X	X	X						X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By / Date/Time	Received By / Date/Time
Doug Bowers 10-21-99/1400	Ref 3C 10-21-99/1400
Ref 3C 10-22-99/0800	RHuman/RKKittrell 10-22-99 0800
RHuman RKKittrell 10-22-99/1430	FED EX 10/22/99
FedEx 10/23/99 12:00	TNV McGoldenberg 10/25/99 9:00

SPECIAL INSTRUCTIONS

See chain of custody comments on SAF B99-078.

(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); ICP Metals - 6010A (Supertrace Add-On) (Beryllium, Copper, Nickel, Vanadium, Zinc); Mercury - 7471 - (CV); Chromium Hex - 7196
(2) NO2/NO3 - 353.1; IC Anions - 300.0 (Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); Sulfides - 9030; Ammonia - 350.3; Total Cyanide - 9010
(3) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241); Strontium-89,90 -- Total Sr; Total Uranium (Uranium); Isotopic Plutonium; Isotopic Thorium (Thorium-232); Americium-241

use BOW8C1 as T.A. to ship

Matrix *

Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By / Date/Time

0000024

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 200-CW-1			DATA PACKAGE: H0590		
VALIDATOR: JCL		LAB: TNU		DATE: 1/31/00	
CASE:			SDG: H0590		

ANALYSES PERFORMED					
☐ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☒ Total Uranium	☐ Radium-22	☒ Tritium	☒ NI-63		

SAMPLES/MATRIX				
BOWMD1	BOWMD2	BOWMD3	BOWMD4	
BOWMD5	BOWMD6	BOWMD7	BOWMD8	
				Soil

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . Yes No (N/A)

Comments: _____

2. Initial Calibration . . . . . ☐ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments: _____

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments: _____

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	Yes	No	N/A
Method blank results acceptable?	Yes	No	N/A
Analytes detected in method blank?	Yes	No	N/A
Field blank(s) analyzed?	Yes	No	N/A
Field blank results acceptable?	Yes	No	N/A
Analytes detected in field blank(s)?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments: _____

5. Matrix Spikes . . . . . ☐ N/A

Matrix spike analyzed?	Yes	No	N/A
Spike recoveries acceptable?	Yes	No	N/A
Spike source traceable?	Yes	No	N/A
Spike source expired?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments: _____

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed?	(Yes)	No	N/A
LCS recoveries acceptable?	(Yes)	No	N/A
LCS traceable?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: Am241 LCS nat/w sDG J
S90 gamma spec MD2 - nat w/sDG J

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added?	(Yes)	No	N/A
Chemical recovery acceptable?	(Yes)	No	N/A
Chemical carrier traceable?	Yes	No	(N/A)
Chemical carrier expired?	Yes	No	(N/A)
Transcription/Calculation errors?	Yes	No	(N/A)

Comments:

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed?	(Yes)	No	N/A
RPD Values Acceptable?	Yes	(No)	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: thorium-228 (40%) Th 230 - 43% - J
S-90 dup nat w/sDG J

A-81 000028

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed?	(Yes)	No	N/A
Field duplicate RPD values acceptable?	(Yes)	No	N/A
Field split sample(s) analyzed?	Yes	(No)	N/A
Field split RPD values acceptable?	Yes	No	(N/A)
Performance audit sample(s) analyzed?	Yes	(No)	N/A
Performance audit sample results acceptable?	Yes	No	(N/A)

Comments:

10. Holding Times

Are sample holding times acceptable?	(Yes)	No	N/A

Comments:

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses?	(Yes)	No	N/A
Results supported in raw data?	Yes	No	(N/A)
Results Acceptable?	(Yes)	No	N/A
Transcription/Calculation errors?	Yes	No	(N/A)
MDA's meet required detection limits?	Yes	(No)	N/A
Transcription/calculation errors?	Yes	No	(N/A)

Comments: D1- 152, 155 D2-152, 155 D3-152, 155 D4-152, D5-152, 155 D6-

A-4

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0590

N910196-11 B0WMD6

DUPLICATE

SDG 7257 Client/Case no Hanford SDG H0590

Contact Melissa C. Mannion Case no TRB-SBB-207925

DUPLICATE ORIGINAL

Lab sample id N910196-11 Lab sample id N910196-06 Client sample id B0WMD6

Dept sample id 7257-011 Dept sample id 7257-006 Location/Matrix 200 B Pond SOLID

Received 10/25/99

% solids 90.2 Collected 10/21/99 11:30

Custody/SAF No B99-078-145 B99-078

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Tritium	-0.006	0.061	0.10	400	U	H	-0.048	0.057	0.099	U	-	
Technetium 99	-0.130	0.15	0.49	15	U	TC	-0.101	0.27	0.62	U	-	
Plutonium 238	-0.005	0.010	0.028	1.0	U	PU	0.007	0.007	0.027	U	-	
Plutonium 239/240	0	0.005	0.020	1.0	U	PU	-0.007	0.014	0.039	U	-	
Nickel 63	0.737	1.3	2.2	30	U	NI_L	0.427	1.4	2.3	U	-	
Americium 241	0.007	0.022	0.035	1.0	U	AM	0.037	0.037	0.052	U	-	
Total Strontium	4.26	0.24	0.13	1.0		SR	4.03	0.17	0.090		6	24
Thorium 228	0.569	0.17	0.17	1.0	J	TH	0.378	0.17	0.20	J	40	77
Thorium 230	0.787	0.18	0.17	1.0	J	TH	0.506	0.20	0.23	J	43	63
Thorium 232	0.424	0.12	0.072	1.0	J	TH	0.356	0.13	0.12	J	17	69
Potassium 40	11.8	0.74	0.35			GAM	12.4	0.86	0.22		5	35
Cobalt 60	U		0.043	0.050	U	GAM	U		0.022	U	-	
Cesium 137	0.186	0.040	0.036	0.10		GAM	0.157	0.028	0.031		17	53
Europium 152	U		0.080	0.10	U	GAM	U		0.057	U	-	
Europium 154	U		0.14	0.10	U	GAM	U		0.079	U	-	
Europium 155	U		0.076	0.10	U	GAM	U		0.093	U	-	
Radium 226	0.564	0.071	0.062	0.10		GAM	0.484	0.048	0.044		15	40
Radium 228	0.697	0.15	0.14	0.20		GAM	0.782	0.10	0.093		11	48
Thorium 228	0.845	0.063	0.060			GAM	0.678	0.034	0.027		22	35
Thorium 232	0.697	0.15	0.14			GAM	0.782	0.10	0.093		11	48
Americium 241	U		0.059		U	GAM	U		0.033	U	-	
Uranium 238	U		4.6		U	GAM	U		2.9	U	-	
Uranium 235	U		0.12		U	GAM	U		0.090	U	-	

200 Area Soure Chara. - 200-CW-1 OU

QC-DUP#6 32743

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 01/12/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0590

METHOD SUMMARY

AMERICIUM 241 IN SOIL
ALPHA SPECTROSCOPY

Test AM Matrix SOLID
SDG 7257
Contact Melissa C. Mannion

Client Hanford
Contract TRB-SBB-207929
Case no SDG H0590

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Americium 241
Preparation batch 6904-172					
BOWMD1	N910196-01			7257-001	0.966 J
BOWMD2	N910196-02			7257-002	1.14
BOWMD3	N910196-03			7257-003	0.337 J
BOWMD4	N910196-04			7257-004	1.32
BOWMD5	N910196-05			7257-005	0.281 J
BOWMD6	N910196-06			7257-006	U
BOWMD7	N910196-07			7257-007	U
BOWMD8	N910196-08			7257-008	U
BLK (QC ID=32742)	N910196-10			7257-010	U
LCS (QC ID=32741)	N910196-09			7257-009	ok
Duplicate (N910196-06)	N910196-11			7257-011	- U
Nominal values and limits from method				RDLs (pCi/g)	1.0
00 Area Soure Chara. - 200-CW-1 OU					

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MDA pCi/g	ALIQ g	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Operation batch 6904-172 2σ prep error 5.0 % Reference Lab Notebook 6904 pg. 172																
MMD1	N910196-01			0.037	0.500			60		806			77	12/22/99	01/06	SS-013
MMD2	N910196-02			0.045	0.500			66		806			77	12/22/99	01/06	SS-015
MMD3	N910196-03			0.042	0.500			70		806			77	12/22/99	01/06	SS-016
MMD4	N910196-04			0.056	0.500			82		760			77	12/22/99	01/06	SS-063
MMD5	N910196-05			0.051	0.500			80		760			77	12/22/99	01/06	SS-064
MMD6	N910196-06			0.052	0.500			54		896			78	12/22/99	01/07	SS-010
MMD7	N910196-07			0.025	0.500			88		896			78	12/22/99	01/07	SS-011
MMD8	N910196-08			0.028	0.500			78		896			78	12/22/99	01/07	SS-012
(QC ID=32742)	N910196-10			0.024	0.500			83		896				12/22/99	01/07	SS-013
(QC ID=32741)	N910196-09			0.046	0.500			88		765				12/22/99	12/31	SS-059
licate (N910196-06)	N910196-11			0.035	0.500			77		896			78	12/22/99	01/07	SS-018
(QC ID=32743)																
nal values and limits from method				1.0	0.500			20-105		700	100		180			

Lab id TMAC
Protocol Hanford
Version Ver 1.0
Form DVD-CWE
Version 3.05
Report date 02/10/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0590

METHOD SUMMARY

TOTAL STRONTIUM IN SOIL

BETA COUNTING

Test SR Matrix SOLID
SDG 7257
Contact Melissa C. Marston

Client Hanford
Contract TRB-SBB-207925
Case no SDG H0590

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Total Strontium
Preparation batch 6904-172					
BOWMD1	N910196-01			7257-001	12100
BOWMD2	N910196-02			7257-002	9950
BOWMD3	N910196-03			7257-003	1580
BOWMD4	N910196-04			7257-004	996
BOWMD5	N910196-05			7257-005	384
BOWMD6	N910196-06			7257-006	4.03
BOWMD7	N910196-07			7257-007	4.82
BOWMD8	N910196-08			7257-008	0.656 J
BLK (QC ID=12742)	N910196-10			7257-010	U
LCS (QC ID=12741)	N910196-09			7257-009	ok
Duplicate (N910196-06)	N910196-11			7257-011	ok
Nominal values and limits from method				RDLs (pCi/g)	1.0
200 Area Soure Chara. - 200-CW-1 OU					

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	PKHN keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Separation batch 6904-172 2σ prep error 10.0 % Reference Lab Notebook 6904 pg. 172																
MD1	N910196-01			2.8	1.00			89	3				61	12/20/99	12/21	GRB-220
MD2	N910196-02			6.7	1.00			86	400				69	12/20/99	12/28	GRB-222
MD3	N910196-03			3.4	1.00			90	400				61	12/20/99	12/21	GRB-224
MD4	N910196-04			4.6	1.00			87	400				61	12/20/99	12/21	GRB-228
MD5	N910196-05			0.10	1.00			85	400				61	12/20/99	12/21	GRB-231
MD6	N910196-06			0.096	1.00			98	400				61	12/20/99	12/21	GRB-230
MD7	N910196-07			0.13	1.00			89	400				61	12/20/99	12/21	GRB-202
MD8	N910196-08			0.13	1.00			86	400				61	12/20/99	12/21	GRB-203
(QC ID=12742)	N910196-10			0.12	1.00			72	400					12/20/99	12/21	GRB-208
(QC ID=12741)	N910196-09			0.12	1.00			74	400					12/20/99	12/21	GRB-204
icate (N910196-06)	N910196-11			0.13	1.00			84	200				70	12/20/99	12/30	GRB-202
(QC ID=12743)																
nal values and limits from method				1.0	1.00				100				180			

METHOD SUMMARIES
Page 8
RY DATA SECTION
Page 36

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 02/10/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0590

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOLID
SDG 7257
Contact Melissa C. Mannion

Client Hanford
Contract TRW-SER-207225
Case no SDG H0590

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	Cobalt 60	Cesium 137
Preparation batch 5904-172						
BOWMD1	N910196-01			7257-001	U	721
BOWMD2	N910196-02			7257-002	U	746
BOWMD3	N910196-03			7257-003	U	13.4
BOWMD4	N910196-04			7257-004	U	103
BOWMD5	N910196-05			7257-005	U	28.4
BOWMD6	N910196-06			7257-006	U	0.157
BOWMD7	N910196-07			7257-007	U	0.472
BOWMD8	N910196-08			7257-008	U	0.075 J
BLK (QC ID-32742)	N910196-10			7257-010	U	U
LCS (QC ID-32741)	N910196-09			7257-009	ok	ok
Duplicate (N910196-06)	N910196-11			7257-011	- U	ok
Nominal values and limits from method				RDLs (pCi/g)	0.050	0.10
200 Area Soure Chara. - 200-CW-1 OU						

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF-FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	PKEN keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 5904-172 2s prep error 15.0 % Reference Lab Notebook 5904 pg. 172																
MMD1	N910196-01			0.15	647				233				68	12/02/99	12/28	MB,07.00
MMD2	N910196-02			0.17	637				226				53	12/02/99	12/13	MB,05.00
MMD3	N910196-03			0.14	687				228				53	12/02/99	12/13	02,01.00
MMD4	N910196-04			0.14	542				229				53	12/02/99	12/13	02.03.00
MMD5	N910196-05			0.077	724				229				53	12/02/99	12/13	MB,05.00
MMD6	N910196-06			0.062	597				230				53	12/02/99	12/13	MB,07.00
MMD7	N910196-07			0.057	702				203				53	12/02/99	12/13	02.04.00
MMD8	N910196-08			0.058	682				236				53	12/02/99	12/13	MB,07.00
(QC ID-32742)	N910196-10			0.082	171				235					12/02/99	12/13	MB,05.00
(QC ID-32741)	N910196-09			0.068	171				235					12/02/99	12/13	01.03.00
licate (N910196-06) (QC ID-32743)	N910196-11			0.12	597				234				53	12/02/99	12/13	02.01.00
nal values and limits from method				0.050	171				100				180			

Lab id TMARC
Protocol Hanford
Version Ver 1.0
Form DVD-GMS
Version 3.08
Report date 02/10/00

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 8 February 2000

Information Request

H0590 - Wet chemistry

Page 002, Methods Glossary, does not list cyanice by 9010B as an analysis that was conducted (the data is present, but the data package needs to be corrected).

Copy of revised sheet Attached

BCW 2-8-00

Recra LabNet Philadelphia

WET CHEMISTRY
METHODS GLOSSARY FOR SOIL/SOLIDS SAMPLE ANALYSIS

	ASTM	SW846	OTHER
% Ash	__ D2216-80		
% Moisture	__ D2216-80		__ ILMO4.0 (e)
% Solids	__		✓ ILMO4.0 (e)
% Volatile Soilids	__ D2216-80		
ASTM Extraction in Water	__ D3987-81/85		
BTU	__ D240-87		
CEC		__ 9081	__ c
Chromium VI		✓ 3060A/7196A	
Corrosivity __ by coupon __ by pH		__ 1110(mod) __ 9045C	
Cyanide, Total		RLW 2-9-00 ✓ 9010B	__ ILMO4.0 (e)
Cyanide, Reactive		__ Section 7.3	
Halides, Extractable Organic		__ 9020B	__ EPA 600/4/84-008
Halides, Total		__ 9020B	__ EPA 600/4/84-008
EP Toxicity		__ 1310A	
Flash Point		__ 1010	
Ignitability		__ 1010	
Oil & Grease		__ 9071A	
Carbon, Total Organic		__ 9060	__ Lloyd Kahn (mod)
Oxygne Bomb Prep for Anions	__ D240-87(mod)	__ 5050	
Petroleum Hydrocarbons, Total Recoverable		__ 9071	__ EPA 418.1
pH, Soil		✓ 9045C	
Sulfide, Reactive		__ Section 7.3	
Sulfide		✓ 9030B(mod)	
Specific Gravity	__ D1429-76C/	__ D5057-90	
Sulfur, Total		__ 9056	
Synthetic Prpearation Leach		__ 1312	
Paint Filter		9095A	

Other: Nitrate Nitrite **Method:** EPA 353.2

Other: Ammonia **Method** EPA 350.3

Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate } EPA 300.0

L-WI-034/B-06/99

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 11 February 2000

Rejected data

110590 - VOA-Diesel range organics

Due to the surrogate being diluted out, the diesel range organics result in samples B0WM04 will be rejected.

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 11 February 2000

Rejected data

HO590 - PCB

Due to the surrogate being diluted out, the aroclor-1016/1221/1232/1242/1248/1254 results in samples B0WMD1, B0WMD2, B0WMD3, B0WMD4, and B0WMD5 will be rejected.

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 8 February 2000

Rejected data

HO590 - Metals

Due to a matrix spike recovery of -120%, the mercury results in samples B0WMD6, B0WMD7 and B0WMD8 will be rejected.

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 8 February 2000

Information Request

110590 - Semivolatile

The analytical performance information provided for this project does not list any levels for semi-VOAs, what do you want me to use for PQLs and accuracy/precision limits??

Bruce

Use contract PQLs and apply Precision/Accuracy criteria similar to other requirements for this SDF

RLW 2-8-00

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 8 February 2000

Information Request

H0590 - Wet chemistry

Page 002, Methods Glossary, does not list cyanice by 9010B as an analysis that was conducted (the data is present, but the data package needs to be corrected).

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: B. Christian Fax: ~~R Weiss~~ 375-5151

From: R Weiss Date: 2-1-00

Re: IR #0570 Pages: 2

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

See attached

Rich

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 31 January 2000

Information Request

H0590

The sample summary lists the replicate samples as B0WN02 and B0WMX1, however those samples are in a different SDG. Were the duplicates run in different SDGs??

Bruce,
The sample summary has some errors. BOWN02 & BOWMX1 are not associated with this SDG. Field replicates in this SDG are BOWMD1 & BOWMD2. There also is a Quaterna split (BOWMM2). We are rechecking the summary information and will provide you with a new one soon.

Rich Main 2-1-00

TRANSMISSION RESULT REPORT (FEB 01 '00 03:17PM)
BHI S&D MANAGEMENT 509 372 9487
(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
018	MEMORY TX		3755151	02/02	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

Facsimile Transmittal

To: B. Christian Fax: ~~R Gates~~ 375-5151

From: R Wells Date: 2-1-00

Re: IR #0570 Pages: 2

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

See attached

#1

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 8 February 2000

Information Request

110590 - Semivolatile

The analytical performance [illegible] this project does not list any levels for semi-VOAs, what do you w[illegible] accuracy/precision limits??

Br[illegible]

[illegible] standard 5 VOA PQLs here.

h

Duncan, Jeanette M

From: Todd, Mary E
Sent: Wednesday, March 15, 2000 1:18 PM
To: Duncan, Jeanette M
Subject: *validation reports*

Jeanette,

We do not have any comments on the validation packages. We will support the comments from Rich.

Thanks

Mary & Chris

Review Comment Record (RCR)

1. Date	2. Review No.
2/25/00	BHI/QA0015
3. Project	**4. Page**
200-CW-1	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. H0509	200 Area Source Characterization – 200-CW-1 Operable Unit	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval:

Organization Manager (Optional) Date

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact Date

Author/Originator

11. CLOSED

3/15/00

Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	PCB: OK – No Comments			
2	Radiochemistry: Page 010, Need to indicate the results for Total Uranium is in µg/g.		Correct K	
3	Wet Chemistry: OK – No Comments		Correct K	
4	Volatiles: Page 09, under Diesel range organics the sample number is B0WDM4. This should be B0WMD4.			
5	Volatiles: Page 11 and 12 indicates the units are UG/KG; whereas, the reported units for the Alcohol and Diesel are in MG/KG. Possibly it would be clearer if the pages were broken down with the first page titled Volatile Organic Analysis, Soil Matrix (UG/KG) and the second page being titled Alcohol and Diesel Analysis, Soil Matrix (MG/KG)		Correct K	
6	Inorganic: Page 10, The page title indicates the units as UG/KG; whereas, the units are MG/KG.		Correct K	
7	Semivolatile: OK – No Comments			
8				
9				
10				

Review Comment Record (RCR)

1. Date	2. Review No.
2/25/00	BHI/QA0015
3. Project	4. Page
200-CW-1	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. H0509	200 Area Source Characterization – 200-CW-1 Operable Unit	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval:

Organization Manager (Optional) _____ Date _____

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

11. CLOSED

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	PCB: OK – No Comments			
2	Radiochemistry: Page 010, Need to indicate the results for Total Uranium is in µg/g.			
3	Wet Chemistry: OK – No Comments			
4	Volatiles: Page 09, under Diesel range organics the sample number is B0WDM4. This should be B0WMD4.			
5	Volatiles: Page 11 and 12 indicates the units are UG/KG; whereas, the reported units for the Alcohol and Diesel are in MG/KG. Possibly it would be clearer if the pages were broken down with the first page titled Volatile Organic Analysis, Soil Matrix (UG/KG) and the second page being titled Alcohol and Diesel Analysis, Soil Matrix (MG/KG)			
6	Inorganic: Page 10, The page title indicates the units as UG/KG; whereas, the units are MG/KG.			
7	Semivolatile: OK – No Comments			
8				
9				
10				

Review Comment Record (RCR)

1. Date	2. Review No.
2/03/00	BHI/QA0013
3. Project	**4. Page**
200-CW-1	Page 1 of 3

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. H0506	200 Area Source Characterization – 200-CW-1 Operable Unit	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval: 10. Agreement with indicated comment 11. CLOSED

Organization Manager (Optional) Date Reviewer/Point of Contact

Author/Originator

a new item on page 3
item 16 not corrected as indicated.
Claude

12. Item	13. Comment(s)/Discrepancy(s) (Provide te comment and detailed recommendation of th resolve the discrepancy/problem indicated.)	ition (Provide justification if NOT accepted.)	16. Status
✓	General Comment: None of the packages had for the qualifiers. The validation procedures ca copies data validation supporting documentation package. This would include missed hold time in matrix spike, duplication data, LCS data, etc.	Cases the MS/MSD is included on the In other cases the appropriate item has been added.	
✓1	PCB: Page 010, indicates the CRDL to be 0.1 with the units to be UG/KG. The CRDL for PCB should would also change the conclusion that the laboratory limits on page 003 and 004.	Corrected	
✓2	PCB: Page 002, Matrix Spike indicates the control lim ~ 150%; whereas, the project document (DOE?RL 99-07) specifies the control limits to be 70 to 130%.	Corrected per new guidelines	
✓3	PCB: Page 003, Precision indicates the specified RPD to be 35%; whereas, the project documents (DOE/RL 99-07) specifies the RPD acceptance limit to be ±30%.	Corrected per new guidelines	
✓4	Radiochemistry: Page 003 top of page for accuracy specifies the matrix spike recovery range is 70 to 130%. This should read matrix spike recovery range is 70 to 130% or 80 to 120%, since the isotopes determined by GeLi/HPGe recovery range is 80 to 120 % as specified in the project documents.	Corrected per new guidelines	
✓5	Radiochemistry: Page 003 indicates that Np to be qualified as "J" because	JE 2/11/00	

Review Comment Record (RCR)

1. Date	2. Review No.
2/03/00	BHI/QA0013
3. Project	**4. Page**
200-CW-1	Page 2 of 3

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	the tracer recovery was 23%; however, above it states the acceptable range for tracer recovery is 20 to 105%. It would appear that tracer for Np falls in this range and should not be qualified.		corrected	
6	Radiochemistry: Page 003, Precision indicates acceptable RPD to be 35%; whereas, project documents has acceptance for precision to be 30%.		corrected per new guidelines	—
7	Radiochemistry: Page 11 the required detection limits for Co-60, Eu-152 and 154 are in different then those specified by the project. Co-60 should be 0.1, Eu-152 and 154 should be 0.2. With these changes the isotopes listed on pages 004 and 005 will need reviewed.		corrected per new guidelines	—
8	Wet Chemistry: Page 002, Accuracy has the matrix recovery acceptance limits as 75 to 125%; whereas, the project requirements are 70 to 130% recovery.		corrected per new guidelines	—
9	Wet Chemistry: Page 003, Precision has the RPD limits as ±35%; whereas, the project requirements are ±30% RPD.		corrected per new guidelines	—
10	Wet Chemistry: Page 010 does not indicate a CRDL for Cr-VI. Project PQL for Cr-VI is 0.7 MG/KG. This would make the laboratory DL for sample B0W694 above the project PQL.		corrected	
11	Volatiles: The detection limits listed on page 011 do not meet the project PQL on the majority of the compounds.		corrected per new guidelines	—
12	Semi-Volatiles: Page 001 in the table listing the samples under sample ID it list a sample B0W6B7, this should be B0W697.		corrected	
13	Semi-Volatiles: Again the accuracy and precision acceptance criteria do not reflect project requirements.		corrected per new guidance	—
14	Semi-Volatiles: Project documents call for the determination of tri-butyl phosphate; however, it was no analyzed for by the laboratory and no mention of the lack of tri-butyl phosphate in the validation package.		Rich Wiess resolution	
15	Inorganics: Again the accuracy and precision acceptance criteria do not reflect project requirements.		corrected per new guidelines	—
* 16	Inorganics: Page 010 the heading at the top of the page indicates the units for the data is in UG/KG; whereas, the laboratory data sheets indicate the data is in MG/KG.		corrected Not Corrected (UG)	*
17	Inorganics: The validation report indicates the laboratory detection limit for mercury was exceeded for six of the samples. Reviewing the laboratory			

Review Comment Record (RCR)

1. Date	2. Review No.
2/03/00	BHI/QA0013
3. Project	**4. Page**
200-CW-1	Page 3 of 4

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	detection limits of 0.02 would indicate that they met the projects PQL of 0.05.		Corrected	
	Inorganic: Page 010 most of the CRDL listed are not what the project required.		corrected per new guideline	
	It would appear that the validator either do not have the project specific data requirements or the wrong project data requirements were used for the validation.			

New Item's

PCB's, pg 04, Completeness indicates Data Package No H0534-RLN. this should be Data Package H0506-RLN.

* Inorganic :- Item 16 on page 2 of RCR was not corrected.

Validation Package Review – 200-CW-1 Packages - RL Weiss

Package H0509 – No comments

Package H0534 – No comments

Package H0590 – No comments except

Semivolatile, Pg. 4 & 5, "Analytical Detection Levels"; Wording should be that all non-detects failed to meet detection limits specified by the CRDL. See wording in similar sections of H0506 & H0534.

already corrected - corrections ok

RLW 3/10/2000

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 31 January 2000

Information Request

H0590

The sample summary lists the replicate samples as B0WN02 and B0WMX1, however those samples are in a different SDG. Were the duplicates run in different SDGs??

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 31 January 2000

Information Request

H0590 - Rad

Americium-241 - Blank not prepared with the SDG - J all
Americium-241 - LCS not analyzed with the SDG - J all

Plutonium - Blank and LCS not prepared with the SDG - J all

Thorium - Blank and LCS not prepared with the SDG - J all

Strontium-90 - Duplicate not analyzed with the SDG - J all
Strontium-90 - Sample B0WMD2 was analyzed 8 days after the SDG - J

Gamma Spec - Sample B0WMD2 was analyzed 15 days after the SDG - J

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: B. Christian Fax: ~~R. Weiss~~ 375-5151

From: R. Weiss Date: 2-1-00

Re: ER #0570 Pages: 2

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

See attached

Rich